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Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

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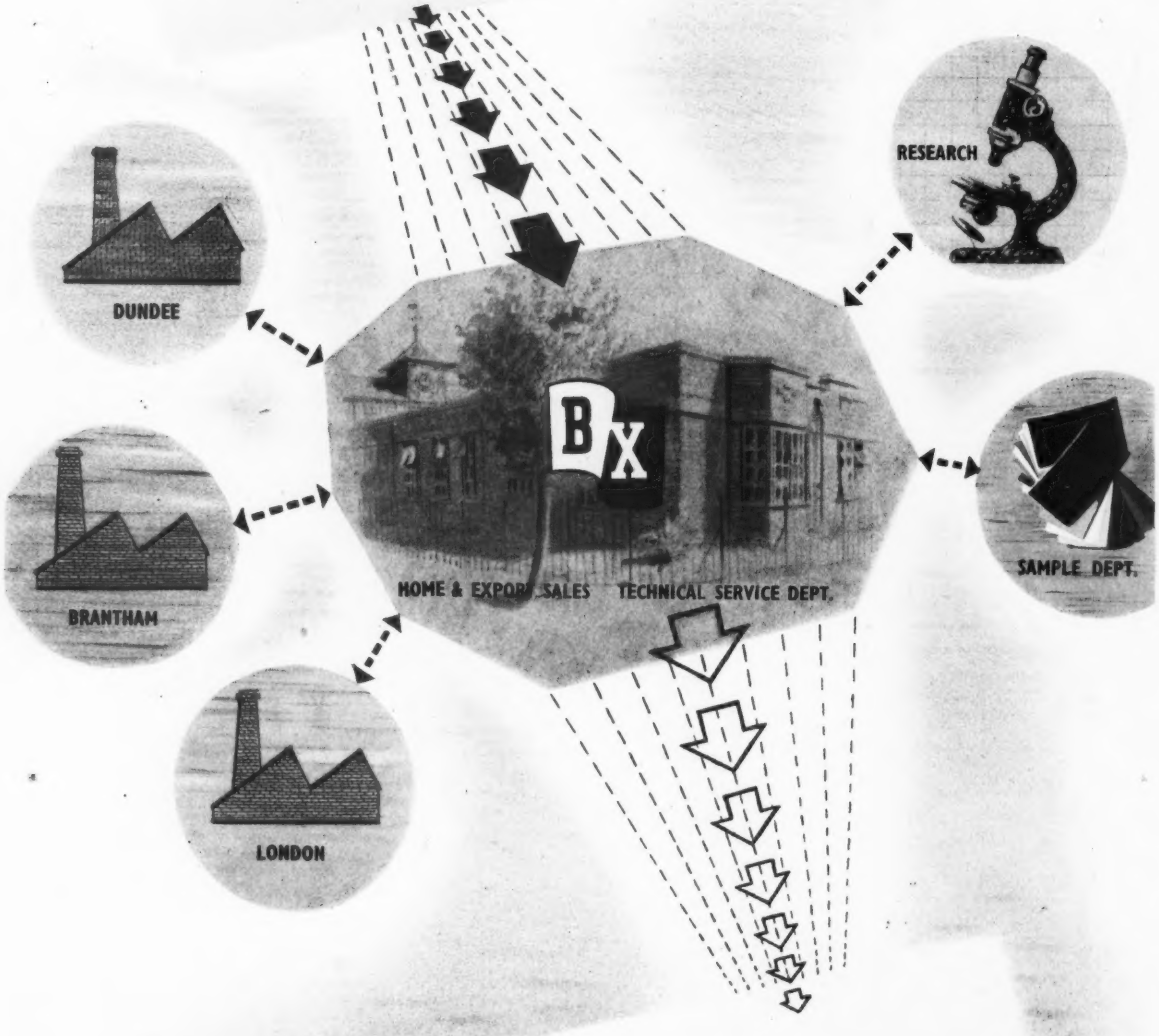

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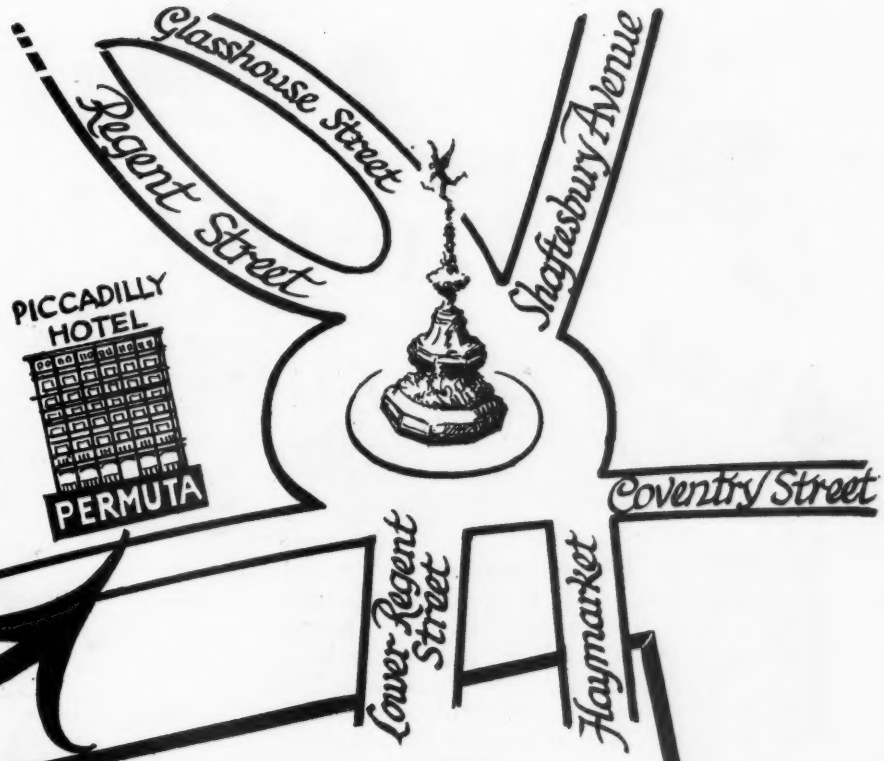

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We welcome all trades to visit our PLASTIC EXHIBITION

What is all this ?

JUST a few bits and pieces ; yet bits and pieces which had to be cunningly planned and carefully designed to fine limits, taxing the ingenuity and skill of the toolmaker ; and finally perfectly moulded in plastics. The little gentleman below is the result of assembly of these "puzzle" bits and pieces. He was a real problem which the Plastomatic Service solved.

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(1) Moulds and delivers at the stipulated times any quantities of any articles already designed and tooled.
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(4) Means exclusivity during the period of the contract.

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641,685

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IF IT CAN BE MOULDED IN PLASTICS WE CAN DO IT-and in the right material

HUPFIELD Plastics

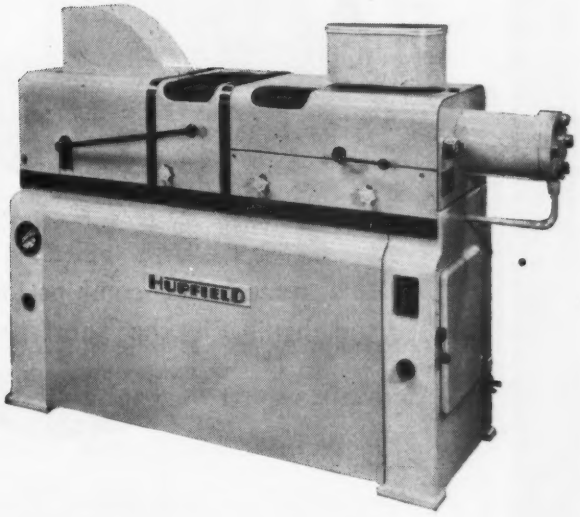
INJECTION MOULDING MACHINES

1 & 2 OUNCE CAPACITY

1952 MODELS

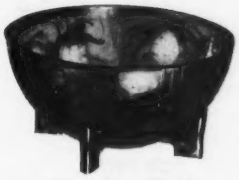
Single lever operated, semi-automatic, hydraulic machine, completely self-contained with electric motor. Fitted with a compensating feed mechanism and the latest Tem-Con automatic temperature control. The machine is economical to run and extremely simple to operate, ideal for female labour. All parts are standardised.

	1 oz.	2 oz.
Mould area approximately..	12 sq. in.	22 sq. in.
Plasticizing capacity per hour	9 lb.	18 lb.
Injection pressure	5½ tons	11 tons
Mould locking pressure ..	22 tons	44 tons
Shots per hour, subject to mould design	350	250



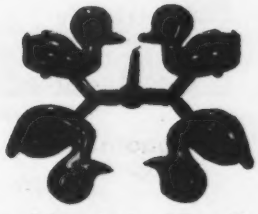
GRANULATING MACHINES

Granulates all thermoplastic materials, delivers at the rate of 80 lb. per hour. Cutting blades are adjustable and easy to clean. Completely self-contained with 2 h.p. electric motor.

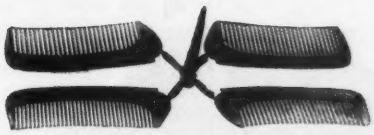


polystyrene 3¾" dia.
25 seconds. 1 ounce.

Mouldings from our 1 ounce machine.



cellulose acetate 5½" × 5"
30 seconds. 31 gramme.



polystyrene 8" × 3½"
20 seconds. 24 gramme.

Write for particulars, or telephone our Works (Wordsworth 4488) for a demonstration.

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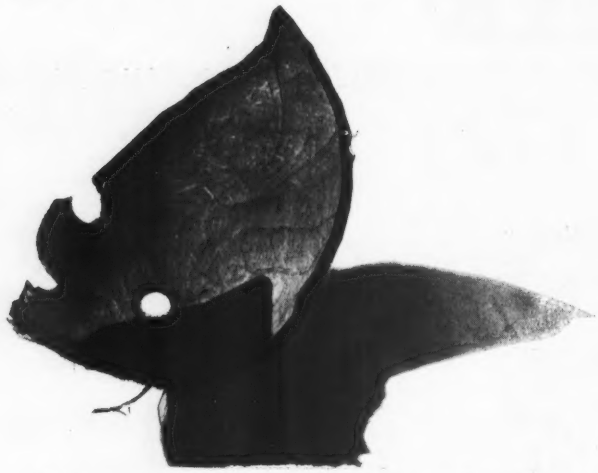
the astonishing strength, hardness, impermeability and endless lasting quality of **coconut shell** are almost unique among natural products



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is made—*a powder whose quality and uniformity can be guaranteed*

there are many ways in which you can use **vavanite** *capillary filler and extender* in the production of better phenolic mouldings

decoratively it imparts a surface gloss unobtainable with any other material

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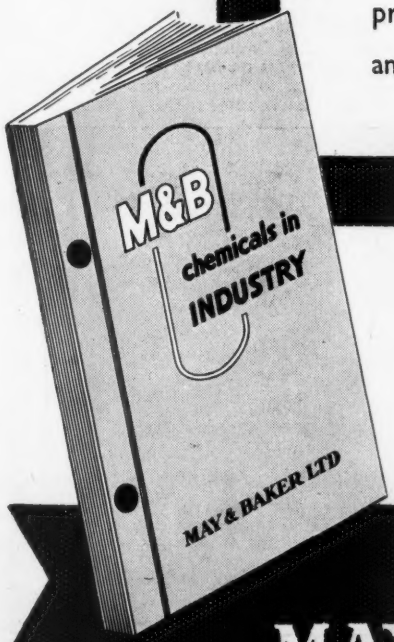

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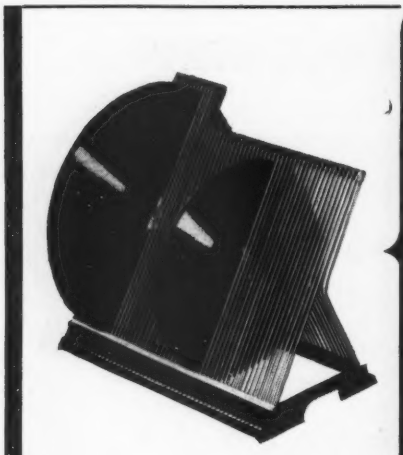


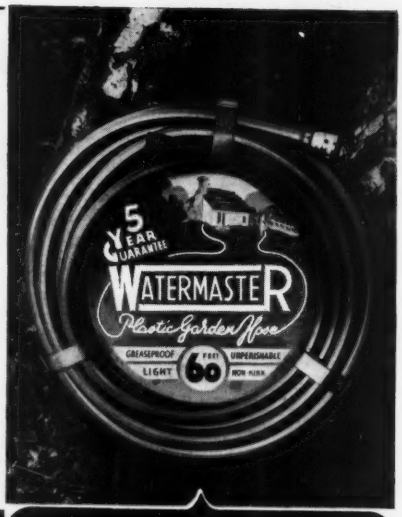
"BROADWAY"

PLASTIC RECORD MAGAZINE

Each "Broadway" magazine has numbered divisions on the injection-moulded base for fifty individual discs, and every disc rests on plastic cushions and between plastic-covered rigid steel wire ("Insulgloss"). This method of construction obviates chipped and cracked record edges and flock-covered playing surfaces.

The "Broadway" is supplied in three sizes, each carrying 50 records, and all types are designed for fitting to cabinets with flaps hinged at the bottom (contents then tip away out of sight with each record resting on its own cushions), or standing in the normal fashion.

Every one of the "Broadway" series is supplied complete with comprehensive filing system for instant selection of the required record.



"FLEXIGAS"

"Flexigas" is the new, super flexible, non-crush, non-kink gas pipe for industrial and domestic use.

"Flexigas" is bound to find a ready welcome amongst users of gas piping everywhere because (*a*) it will not fracture when turned round very small radii (*b*) there is no series of laminations to come apart and outside braiding to become unravelled (*c*) it is uncollapsible, having a tempered steel spring actually **in the wall**, and (*d*) it is extremely tough and abrasion resistant.

"Flexigas" is supplied in brilliant colours, and can be produced in any length.

The correct gas coupling to be used with "Flexigas" is the new plastic one developed by Creators Ltd., or normal rubber or metal kinds.

THESE PRODUCTS ARE

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AND

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Creators Ltd

BIF 1952

These and many more applications of plastics to industrial and domestic problems will be seen on our B.I.F. stand No. V.7 at Earls Court in the Plastics Section. May 5th—16th.

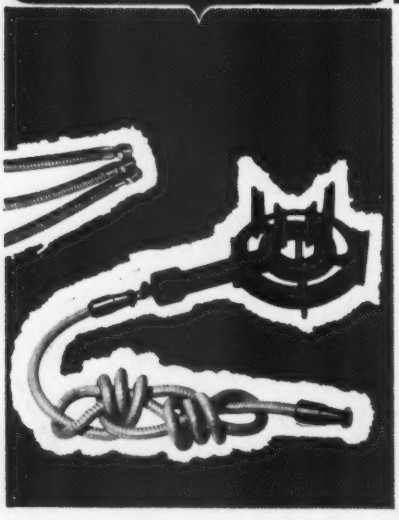
"WATERMASTER"

PLASTIC GARDEN HOSE

No other hose on the market possesses all the features or the quality built into a coil of "Watermaster" Plastic Garden Hose.

Supplied in 60′ coils with a full ½″ bore and heavy wall, it is lighter than comparable rubber hose, unperishable, grease and oil proof, hygienic and non-kink.

"Watermaster" has 'everything' when it comes to sales appeal. Made in a brilliant green plastic with a highly polished surface in a new twelve-sided design, it is coiled in three bright red straps with plated metal buckles for subsequent storage. In the centre of the coil there is a display circle, printed in attractive colours, boldly announcing the FIVE YEAR GUARANTEE which covers every coil of "Watermaster" sold. In addition there is the heavy brass fitting for connection to the water supply. Long lengths can be supplied for special needs.

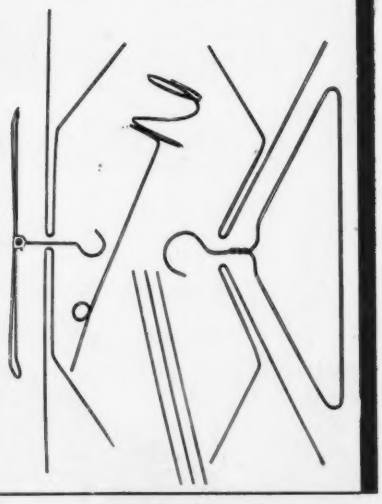


"INSULGLOSS"

"Insulgloss" is the name given to a new wire-covering service by Creators Ltd. for heavy gauges. It is supplied highly polished with a p.v.c. covering of any colour, ready cut in straight, predetermined lengths. The condition of the wire when received by us is not important as it is cleaned, straightened, covered, insulated and cut in the "Insulgloss" process.

The use of the "Insulgloss" service is indicated where articles contacting the wire must be protected from physical damage (an excellent example of such an application is the "Broadway" Record Magazine) or where colour and attractiveness is required.

Chromium-plated wire can be replaced by "Insulgloss" treated wire in many instances.



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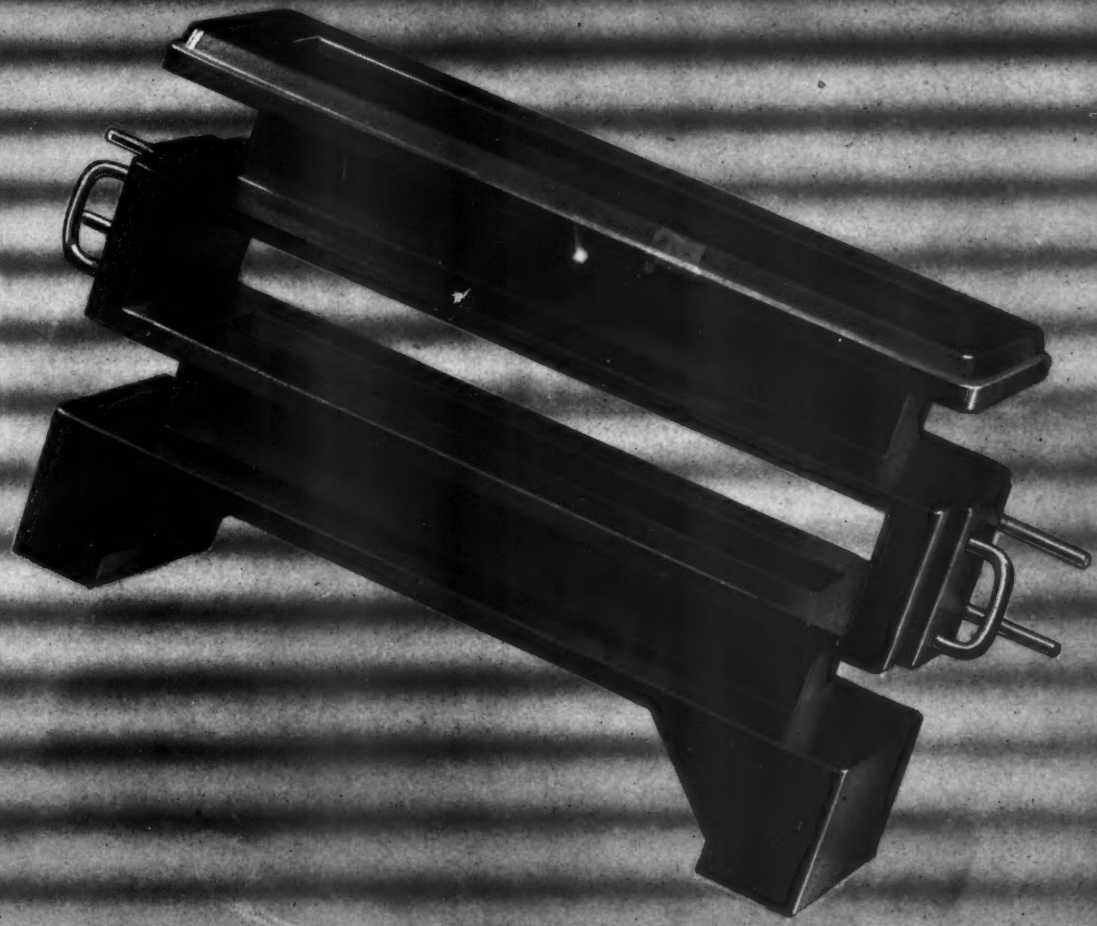

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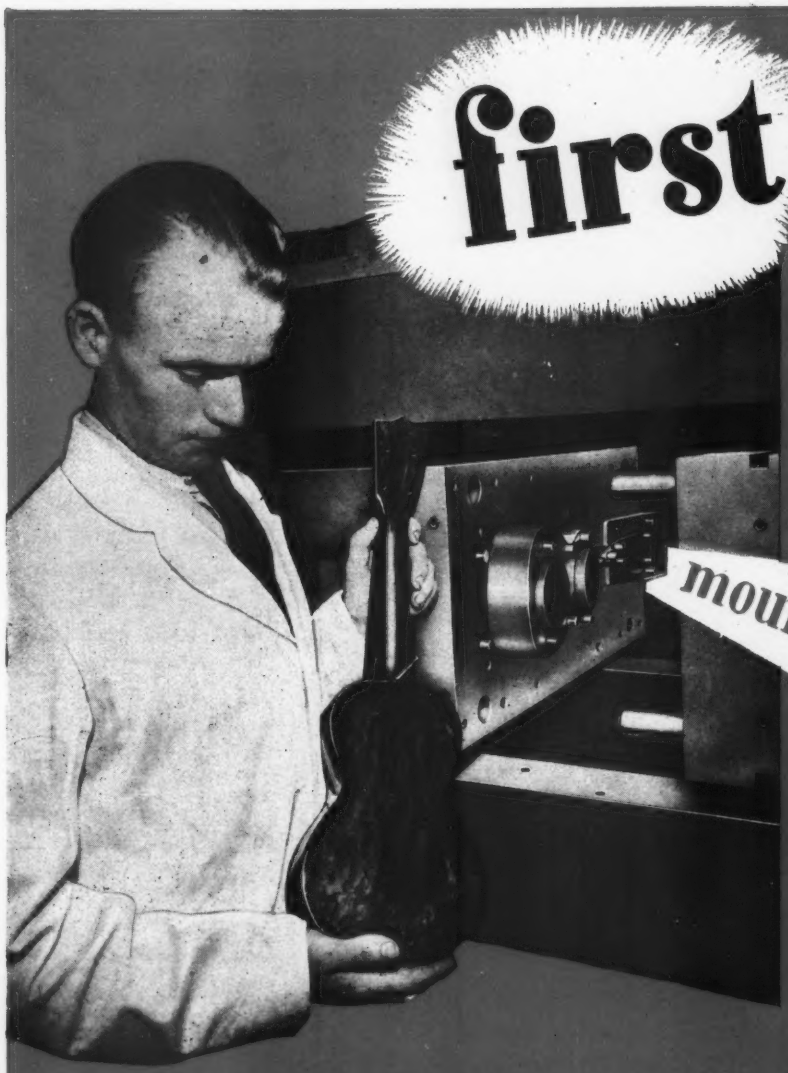

first STRIN

60 SHOT

WEIGHT $6\frac{3}{4}$ oz.

moulded on a 'PECO

Mould Manufactured by Universal Tools Ltd.

THE PROJECTILE & ENGINEERING COMPANY specialise in the manufacture of injection moulding machines and produce a range in 2, 4, 5, 8 and 16 oz. capacities. They are self-contained with automatic cycle and are hydraulically operated. They have a high plasticising capacity and rate of injection. Mould-locking pressure and platen area enable them to operate at a high rate of production.

MOULDS

PECO MOULDS. Expert designers and mould makers are employed and moulds can be supplied to samples submitted, including die-sinking models if required. An important side of the company's work is the hobbing of cavities for moulds and medallions—the plant includes a 3,000 ton hobbing plant. Master hobs to customers' samples made as required.

Full particulars of the **PECO** *range of injection moulding machines and moulds will be sent on request.*

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ED INSTRUMENT
JECTION-MOULDED

IN GREAT BRITAIN AND EUROPE

PER HOUR

GTH 20¼" WIDTH 6¼"
H 2¼"

This genuine musical instrument moulded on a **PECO** 8 oz. capacity machine by the **THAMES VALLEY MOULDERS** incorporates all the features of the best hand-made ukulele at a fraction of the cost. It is being distributed by **SELCOL PRODUCTS LTD.** In precision instruments of this type, where extreme accuracy has to be maintained, it is essential for temperature control to be maintained at a close tolerance to give the stability required.

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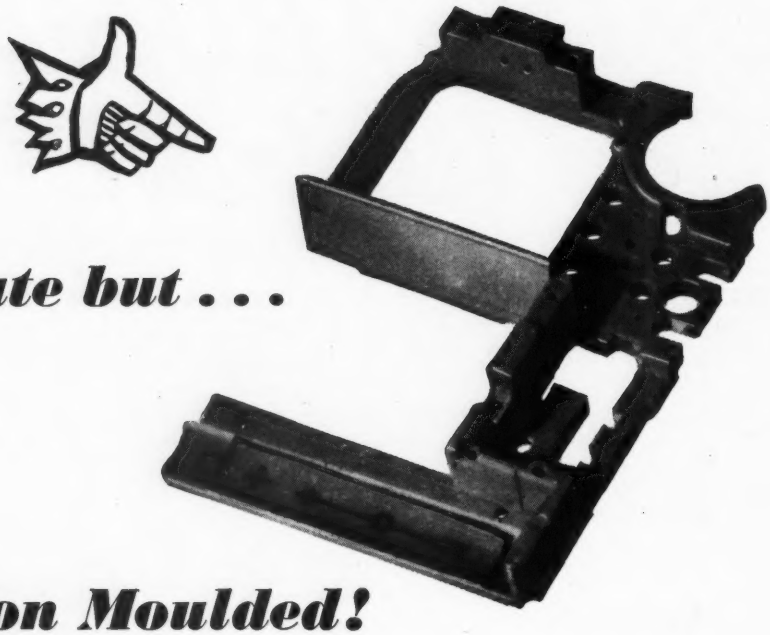

It's Intricate but . . .

it's Injection Moulded!

This tricky little job is the chassis of the Multitone "Selector" Hearing Aid. It is a plastic component, made of cellulose acetate, and its interest lies in the fact that it is an *injection* moulding.

The technique of moulding complicated parts to precision limits by this process has been developed pretty considerably in the last few years. We can now make intricate multi-surfaced flanged and pierced mouldings like this one as easily as we can make a simple coil-winding bobbin.

More and more manufacturers are now using these precision moulded components in place of fabricated parts. They save on materials. They cut out machining, and reduce finishing operations. They often have less weight. And, of course, they cut down costs.

FRASER *and* **GLASS**

the plastics people

Injection mouldings up to 60 ozs !

Thermoplastics—cellulose acetate, polystyrene, nylon, polyethylene, P.V.C. are only a few of them — can now be moulded in sizes up to 12 ozs., while for some types of job we have limited capacity for very large mouldings up to 50 and 60 ozs. We also cater for a wide range of compression and transfer mouldings.

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NEW ▼ RESINS

FOR THE PLASTICS INDUSTRY

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▼Phenolic Moulding Compounds for all purposes

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Play safe with

CELLULOSE ACETATE PLASTICS

SHATTERPROOF

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TOUGH, SMOOTH

HYGIENIC

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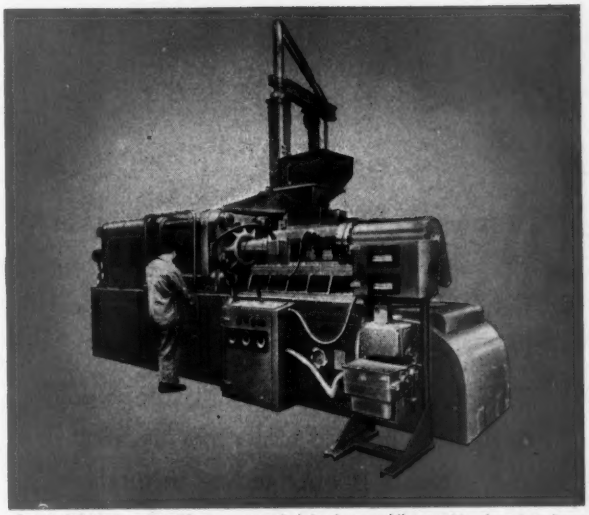
and no jagged edges!

There's no fear of dangerous, jagged edges with toys and dolls made of Cellulose Acetate. Tough and shatterproof, it enables toys to stand up to a lot of hard play. Cellulose Acetate meets the need of every parent by putting safety first in the nursery; and it's odourless, tasteless and non-toxic. All children will like the bright colours and the realistic effect. And *you* will appreciate its toughness, which reduces the risk of transit and counter damage. If you are a retailer, ask your supplier about the characteristics of Cellulose Acetate; if you are a manufacturer, ask the Moulding Powder Producer.

This information is issued for the benefit of the Toy manufacturing and distributive trades by British Celanese Limited, Celanese House, Hanover Square, London, W.1, the largest producers of Cellulose Acetate in Great Britain.



S.H.28/32 This 32 oz. automatic injection moulding machine is a very heavy duty machine incorporating all the latest improvements. Powered by a 55 h.p. motor, the press exerts a locking pressure of 550 tons and has a plasticising capacity of 120-130 pounds per hour.

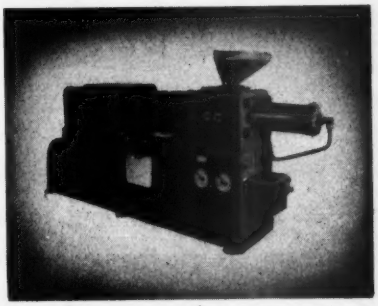
witness the amazing versatility of the Windsor

INJECTION MOULDING & EXTRUSION MACHINES

at B·I·F on

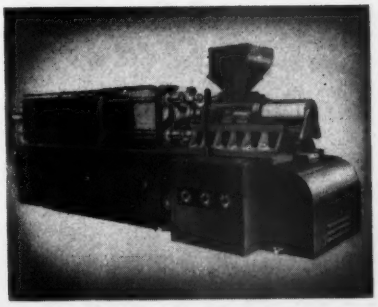
Stand No.C.413/312

CASTLE BROMWICH BIRMINGHAM
MAY 5th - 16th



S.H.4

A 4-oz. machine of robust construction and automatic time cycle control. The toggle mechanism is specially designed to provide a balanced and evenly distributed locking pressure of 150 tons.



S.H.8/10

Producing articles weighing up to 10 oz. per shot. The latest improvement is the inclusion of a hydraulically operated retractable injection unit. Hand or automatic cycle operated.

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MOULDS, DIES **ANCILLARY EQUIPMENT**

R.C.65 Twin-screw extruder, average output 65 pounds per hour, driven by a 5 h.p. motor. Forced-feed lubrication. Control cabinet incorporating three controlling pyrometers.

R.C.100 Twin-screw extruder, average output 100 pounds per hour, driven by a 10 h.p. continuously variable speed motor. Automatic hopper feed synchronised with screw speeds.

R.C.200 Triple-screw extruder, average output 200 pounds per hour. This extruder is exceptionally useful for compounding, colouring and extruding in vinyl, cellulosic and polystyrene materials.

Brilliance and . . . PERMANENCE!

Matthey cadmium pigments—colours as rich and intense as any a butterfly's wing may show—are as remarkable for their endurance as for their brilliance.

Their power of resistance to the action of light, to heat, to mineral acids, alkalis and solvents is outstanding throughout the entire range—from greenish yellow through orange and red to a deep maroon.

Publication 1676 deals fully with the use of cadmium pigments in Polyvinyl Chloride, and we shall be glad to send copies on request. Please do not hesitate to write us regarding any pigmentation problems you may encounter.

Matthey

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One of the Specialised Products of

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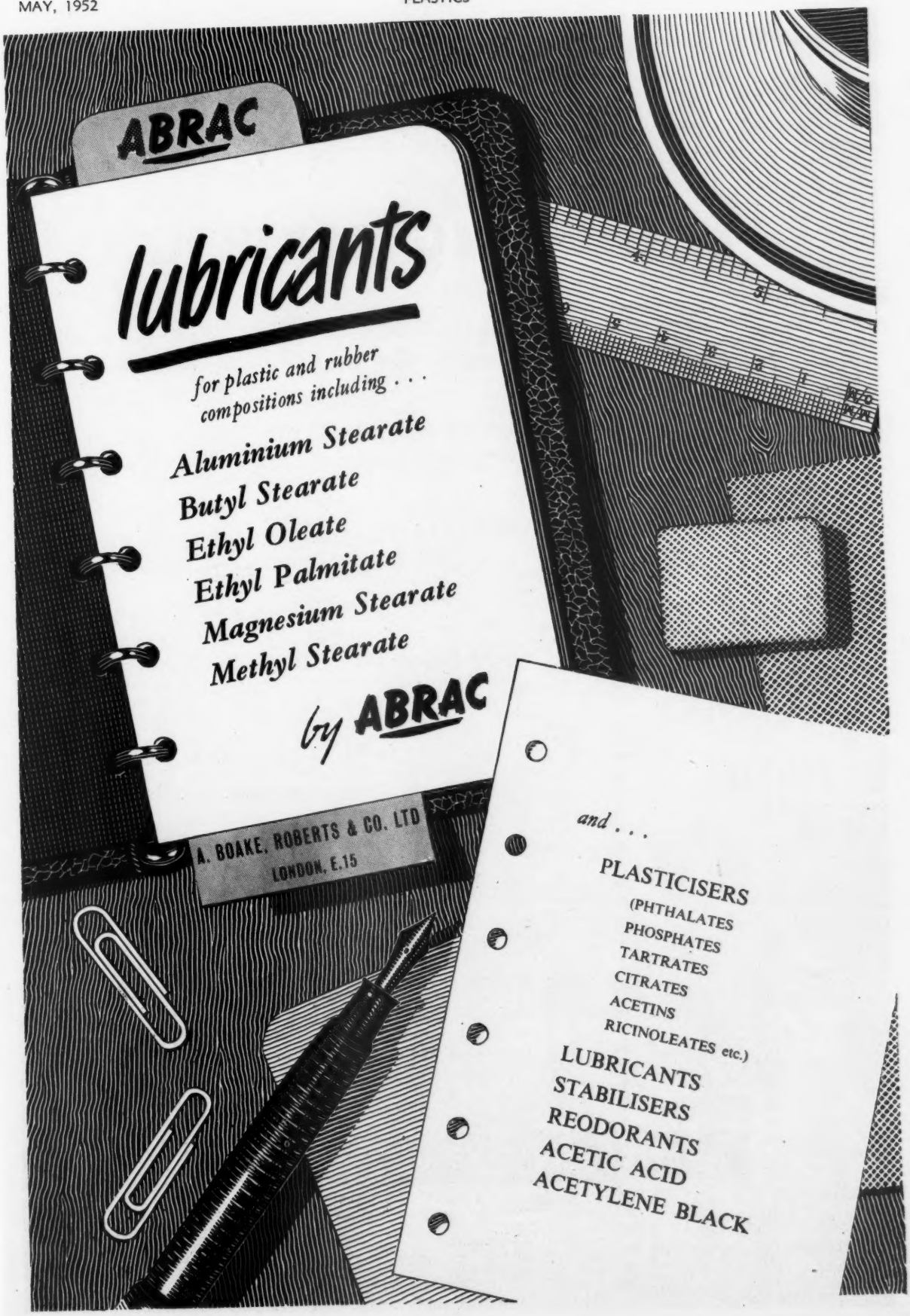
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Sterling
MOULDING MATERIALS

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STERLING policy is to give the close personal attention to customers' individual requirements which is only possible for the smaller manufacturer. There is also a price advantage in dealing with the manufacturer. We believe you will find our prices lower in all cases.

✶ STERNITE **Phenolic Moulding Powder**
FOR COMPRESSION AND TRANSFER MOULDING

General Purpose Grades: conforming to BSS.771. Easy flowing, good finish and fast curing.

Special Purpose Grades: including Telephone Quality SPF.110—improved strength and very good finish. High Resin Content SPF.105/5—extra fast curing, very good finish and especially suitable for moulding around heavy metal inserts.

Shock Resisting Grades: SSR.400/1 — BSS.771. M.S. type — Impact Strength 0.27-0.30 ft. lb. (M.O.S. approved). SSR.410—low bulk and suitable for pelleting. Impact Strength 0.20-0.25 ft. lb. SSR.412—BSS.771. M.S. type—Graphite loaded.

Also Acid Resisting, Water Resisting and Heat Resisting grades.

✶ STERNITE **Urea Moulding Powder**

Available in black wood-filled grade.

✶ STERNITE **Synthetic Resins**

Spirit and Water Soluble types in solid or solution form, prepared according to customers' specific requirements. Ideally suitable for all laminating and impregnating work, tube winding, etc.

Also Resins for Grinding Wheels, Cements and Adhesives.

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Export enquiries to:
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WORKS: STALYBRIDGE, CHESHIRE

A MOULDING THAT HAS AROUSED
GREAT INTEREST IN THE TRADE

Goya's attractive powder bowl, which has won so much admiration in the cosmetic trade, is injection moulded from the recently introduced "Distrene 200X." This new polystyrene possesses outstanding flow properties, which have been increased without sacrificing toughness, heat resistance and high dimensional stability. It is, therefore, a true dual-purpose material: while it will faithfully reproduce the most intricate designs, it is equally ideal for general purpose mouldings where fast cycles are required. "200X" is available in the full range of "Distrene" colours — clear, translucent and opaque. Please write for samples and further information. (Powder bowl designed by Goya Ltd. and moulded by British Artid Plastics Ltd. from "Distrene 200X.")

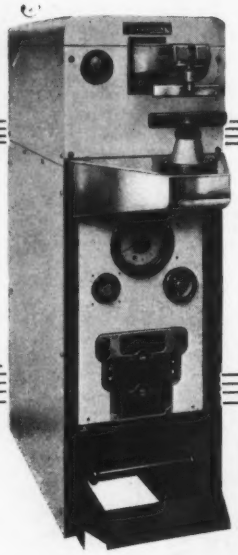
DISTRENE 200X
POLYSTYRENE
INJECTION MOULDING MATERIAL

BRP BRITISH RESIN PRODUCTS LIMITED

Sales & Technical Service, 21 St. James's Square, London, S.W.1. Tel: WHI 8021-7. ("Distrene" is a Registered Trade Mark.)

★ THE LINE TO FOLLOW WHEN **WELDING PLASTICS**

JP1



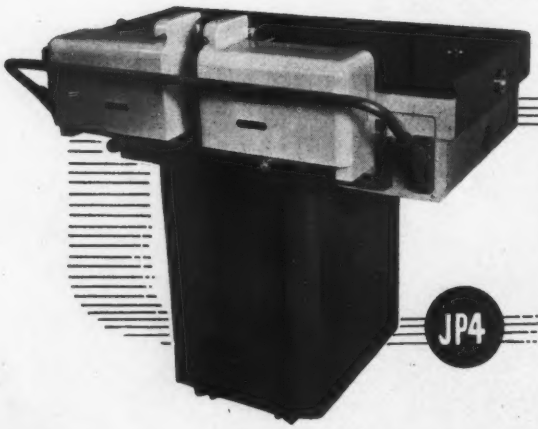
The versatile J.P.I. is the most widely used Plastic Welder for the manufacture o all types of protective clothing, packages, toys, wallets and other fancy goods from sheet P.V.C. The unique design allows one standard unit to do the same work as a whole range of special purpose machines.

The J.P.3 is a fully automatic Press Welder with a platen area of 18" x 14". Many intricate shapes can be welded in one operation. Unskilled workers can produce toys, household gloves, bags for packing and other similar articles at a rate of 600 per hour with this machine.

JP3

- **PACKAGING**
- **WALLETS AND BAGS**
- **RAINCOATS & PROTECTIVE CLOTHING**
- **FANCY GOODS**
- **TOYS**

The J.P.4 is a new, semi-automatic welder for the manufacture of rectangular transparent boxes and lids from cellulose acetate film. An average of 300 medium size boxes an hour can be produced on this machine by entirely unskilled labour. Sizes range from 3" x 1¾" x ¼" to 18" x 12" x 5".



JP4

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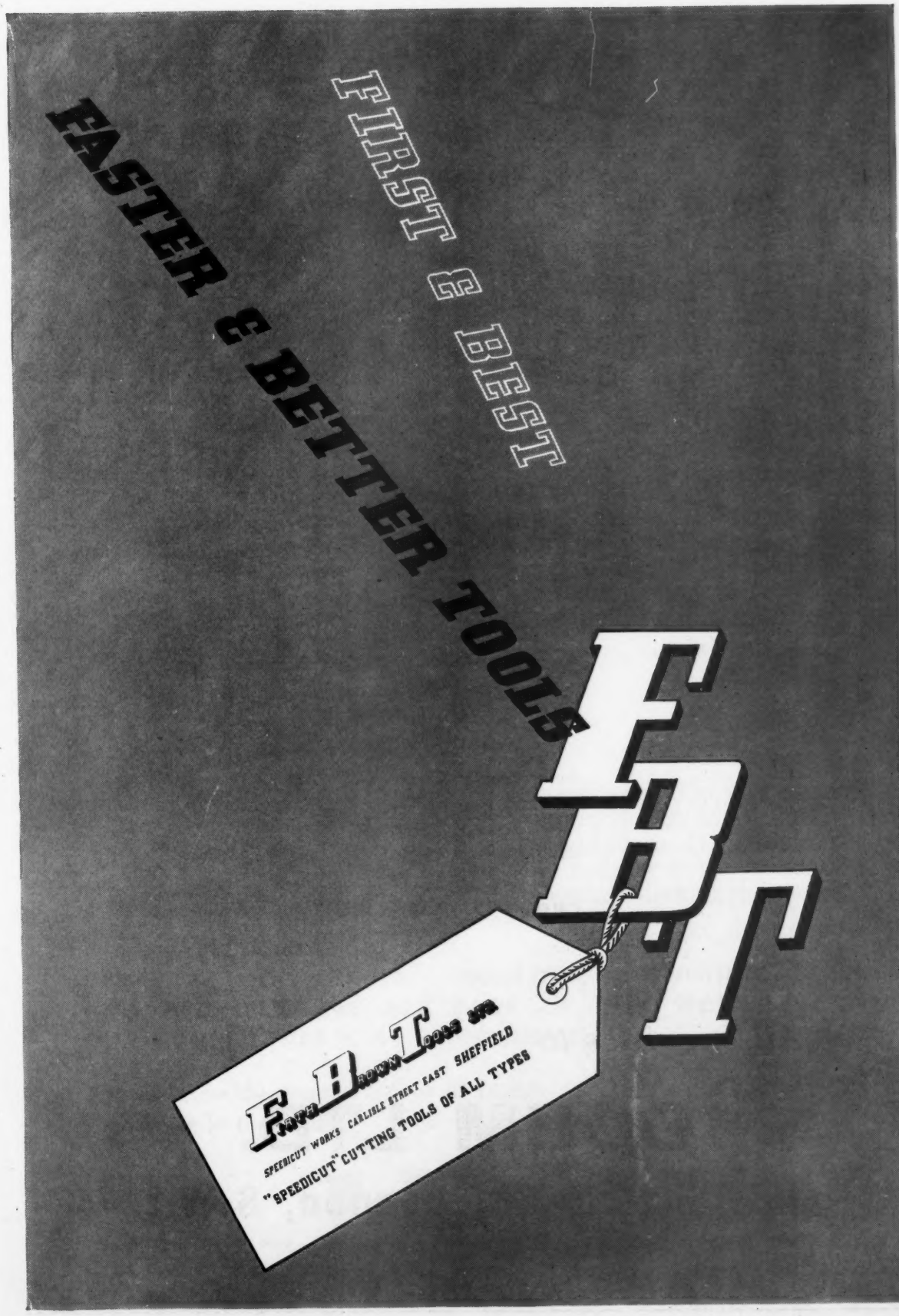
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Reprocessing plant, laboratories and dispatching section are housed under one roof; as a result of this increased capacity they are in a position to quote competitive prices and speedy delivery for the following materials :—

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167 Victoria St., London, S.W.1.

Phone : VIC 1414 *Cable : DOHMS LONDON.*

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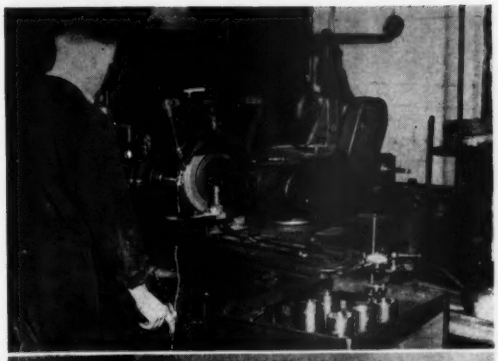

- That we have a large and well-equipped tool room engaged on the manufacture of moulding tools

- We maintain a high standard of inspection and production for all your injection, compression and transfer moulding requirements

- That we produce precision injection mouldings in quantity in—C.A., Diakon, Alkathene Polystyrene, Methyl Methacrylate, etc.

DESIGN · TOOL MAKING · MOULDING · FINISHING AND ASSEMBLY ARE ALL PART OF OUR SERVICE OUR ENTIRE STAFF IS AT YOUR DISPOSAL

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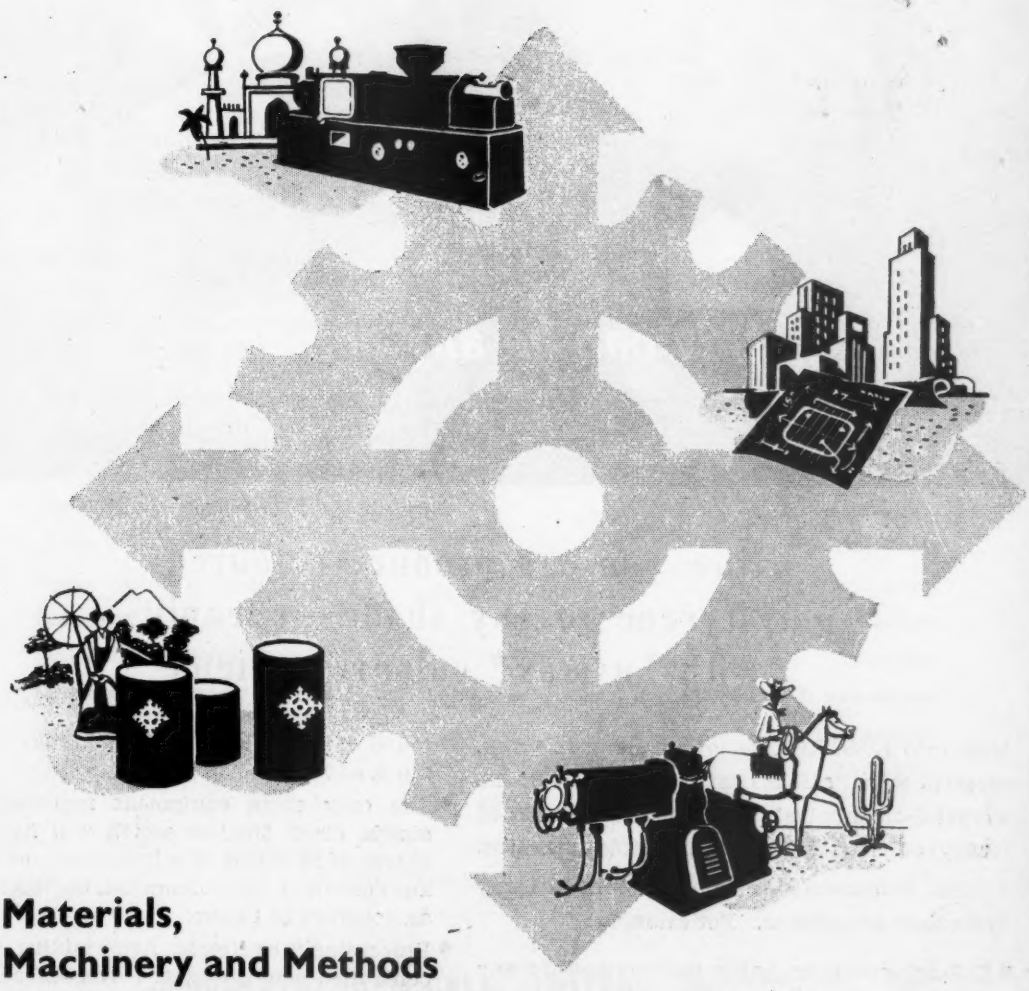

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Now you can produce coloured polystyrene in any shade—cheaply—with Lustrex* colourant blend

Monsanto LUSTREX* is now available in a new, versatile form. This is Lustrex Colourant Blend, a crystal-clear polystyrene specially formulated for dry colouring by the user, in simple apparatus.

This Monsanto development brings many immediate advantages. For example:

- Colouring costs are so low that savings of many pence per lb. can be made, compared with coloured moulding powders. Colourant Blend is supplied at exactly the same price as Crystal Lustrex general grade moulding granules.
- Any colour can be produced at short notice. This permits greater flexibility of operation.
- Only a comparatively small stock of crystal need be carried to produce all the shades desired. Leading moulders in the U.S.A. have found it possible to reduce stocks by as much as 75%.
- The only extra equipment required is a simple drum tumbler which will handle a charge of 50-150 lbs. of polystyrene, and a balance on which the colours can be weighed to an accuracy of 1 mgm.
- Processing is so simple. After mixing, under controlled conditions, the dyestuff adheres uniformly to the surfaces of the Colourant Blend granules. The material can then be removed and fed directly into the injection moulding machine.
- Through the use of Lustrex Colourant Blend it is now possible to produce—at reduced cost—a wide range of toys, novelties, housewares and miscellaneous articles which were previously moulded from processed colours.

For full details and technical information, write now to Plastics Sales Department, Monsanto Chemicals Ltd., Victoria Station House, London, S.W.1.

A few facts about Lustrex

LUSTREX is Monsanto's improved polystyrene. Designed specifically for the injection moulding process, Lustrex permits high-speed production with great accuracy from standard equipment.

It is quick-setting — non-hygroscopic — consistently heat stable — easy to control, as shrinkage is slight.

Lustrex Colourant Blend is now produced at Newport in addition to the well known range of Lustrex moulding powders.

SPECIFIC PROPERTIES

Tensile strength, lbs/sq. in.	6,000-7,000
Elongation at break %	1.5-2.2
Modulus of elasticity in tension, lbs/sq. in.	1.7-4.7 x 10^5
Compressive strength, lbs/sq. in.	11,000-15,000
Impact strength, ft.lbs/in. of notch	0.30-0.37
Flexural strength, lbs/sq. in.	8,000-10,000
Dielectric strength, short time, $\frac{1}{8}$" thickness, volts/nil.	500/700
Dielectric constant, 60 cycles	2.5-2.6
Dielectric constant, 10^3 cycles	2.5-2.6
Dielectric constant, 10^6 cycles	2.5-2.6
Power Factor, 60 cycles	0.0001-0.0003
Power Factor, 10^3 cycles	0.0001-0.0003
Power Factor, 10^6 cycles	0.0001-0.0003
Resistance to acids	Excellent
Resistance to alkalis	Excellent
Resistance to organic solvents	Soluble in aromatic and chlorinated hydrocarbons
Machining qualities	Fair to good
Colour possibilities	Unlimited

** LUSTREX is a Registered Trade Mark*

MONSANTO CHEMICALS LIMITED.
Victoria Station House, London, S.W.1.

In association with:—
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Monsanto Canada Ltd. Montreal.
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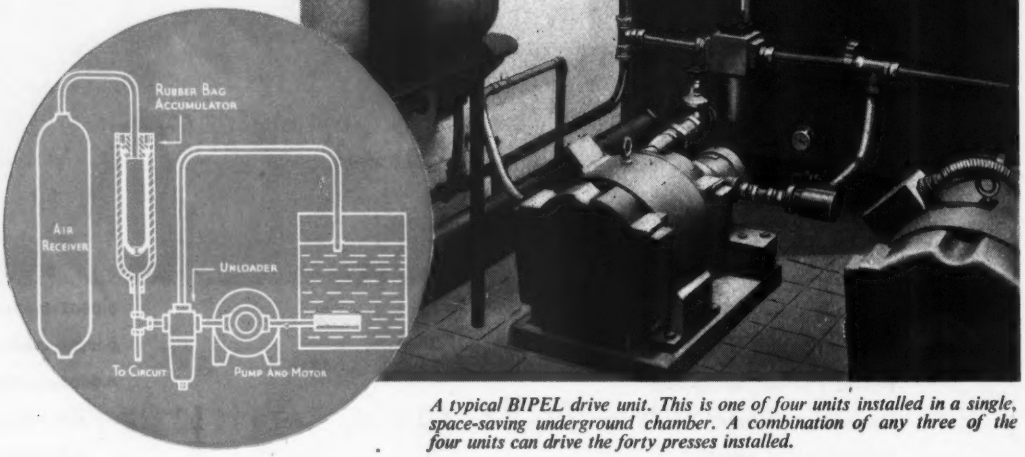
MONSANTO
CHEMICALS — PLASTICS

BIPEL Drive Means New Economy

The BIPEL system of hydraulic drive is unique. It is based primarily on two novel BIPEL devices—a dual ratio (2:1 and 3:1) hydraulic intensifier on the press; and an automatic unloading valve which enables a simple fixed delivery vane pump to be combined with a gas-loaded accumulator. Pressure is generated at the highly economic figure of 1,000 p.s.i.
This medium-pressure-plus-intensifier system provides for the first time three pressures from a single source.

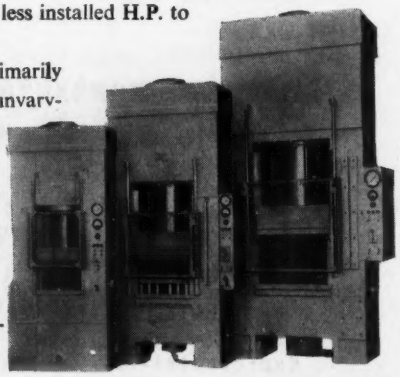


A typical BIPEL drive unit. This is one of four units installed in a single, space-saving underground chamber. A combination of any three of the four units can drive the forty presses installed.

The BIPEL drive system offers a combination of advantages that no other system can offer. It provides a compact, reliable source of hydraulic motive power, cheaper than any other to buy and operate. And, for the first time, it enables a down-stroking prefiller press to provide, from a single supply source, a choice of three moulding pressures at will — the initial line pressure followed by intensified pressures of two or three times that figure.

The maximum advantage is derived when the equipment is installed as a group drive feeding a number of presses, up to ten or twelve. Or, as a built-in unit operating a single press, it has many advantages over conventional high-pressure pumps; it still remains simpler and cheaper, requiring less installed H.P. to drive and retaining the feature of three operative pressures.

The BIPEL system, whilst also applicable to manually operated presses, is primarily designed for auto-control which enables the press to reproduce automatically with unvarying precision, any conceivable moulding cycle including dwelling and breathing.



BIPEL presses are made in three models, each affording three moulding pressures.

TYPE 40: 20, 40, 60 TONS
TYPE 100: 50, 100, 150 TONS
TYPE 200: 100, 200, 300 TONS

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B.I.P. ENGINEERING LTD., ALDRIDGE ROAD, STREETLY, STAFFS.

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It is accepted all over the world for its versatility . . .
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No need either to state the virtues of Kleestron.
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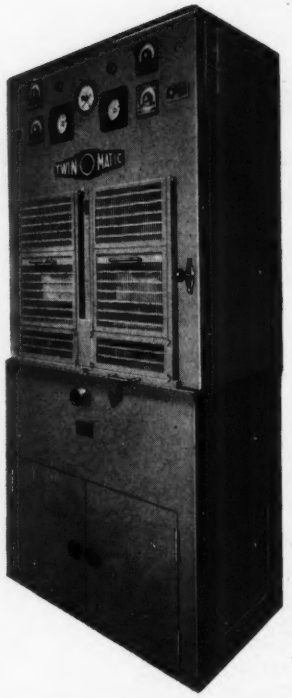
TWIN-O-MATIC

Range of Moulding Presses will double your output with existing labour and space

Supplied ready for immediate action



50 Ton TWIN *Moulding* PRESS

STAND No. C612
at the
B.I.F., CASTLE BROMWICH

Entirely self contained, the TWIN-O-MATIC effects a considerable saving in operational costs. Its ample platen area makes it suitable for the production of a wide range of compression mouldings from single or multi-impression moulds. The normal time taken for loading, unloading and cleaning of moulds is completely eliminated from the moulding cycle, as the rams alternate automatically up and down. A two-stage pump ensures extremely rapid closing of moulds.

SPECIFICATION

PUMP, TWO-STAGE, 13·2 gallons at 200 P.S.I., 1·25 gallons at 2240 P.S.I.
WORKING PRESSURE 2240 P.S.I.
RATING 50 tons per ram. **RAM STROKE** 8".
DAYLIGHT BETWEEN HOT PLATES 16" max.
SIZE OF ELECTRIC HOT PLATES 13" × 15½".
GUARDS Fully interlocked.
ELECTRIC SUPPLY 3 phase 50 cycle A.C. 440V. 4 wire (Alternative Supply to Order)
ELECTRIC MOTOR 2½ h.p. continuous rating.
INSTRUMENTS Two Automatic Timing Clocks. Pressure Gauge. Four Combined Temperature Indicators and Controllers. Two Pilot Lamps. Two Remote Control Stations. Thermostat Pilot Lights.
OIL CAPACITY 35 gallons.
FITTED with Fully Interlocked Isolator and Distribution Board.
OVERALL DIMENSIONS 3' 7" × 2' × 7' 3½".

SEE ALSO
the
TRIPLE TWIN-O-MATIC
25-TON PRESS
on this stand

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The mixture...
The old alchemists used pestles and mortars to break down and mix their ingredients in their search for the Elixir of Life or the Transmutation of Gold. In these enlightened times, however, new materials need new methods, and although we don't build machines for such purposes, the **Shaw Intermix** enclosed type mixing machine has been found to be the answer to the problem of successfully breaking down and mixing natural and synthetic rubbers and for mixing and blending plastics, paint and other materials.
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INTERNAL MIXERS
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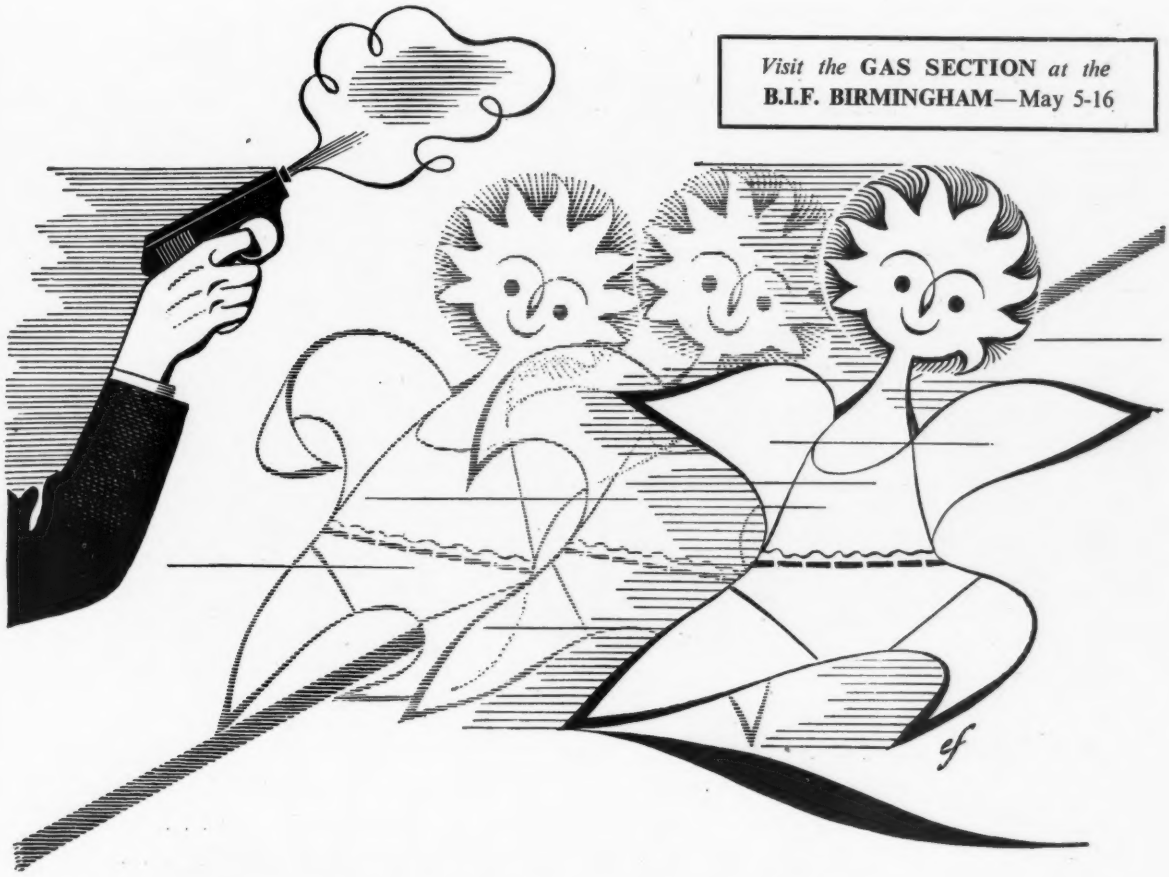
Visit the **GAS SECTION** *at the*
B.I.F. BIRMINGHAM—May 5-16



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For really quick starting, Mr. Therm provides the right fuel every time. Using gas means no waiting around while heat is gradually built up to operating temperature . . . no costly fuel wasted when you don't need to use it. Yes, on top of his other advantages (flexibility, freedom from dirt, efficiency, and even automatic control if required) Mr. Therm is so quick off the mark that he's improved the running of factories all over Britain!

Putting on the pressure

The research departments of a firm well known in the plastics industry have installed modern gas-fired steam boilers. They heat mixing rolls, calendar rolls and presses for moulding; are horizontal type multi-tubular boilers with an operating pressure of 200 lb. per sq. in. and an hourly evaporation of 700 lb.; and are fully automatic, with both high and low water alarm and automatic pump feed.

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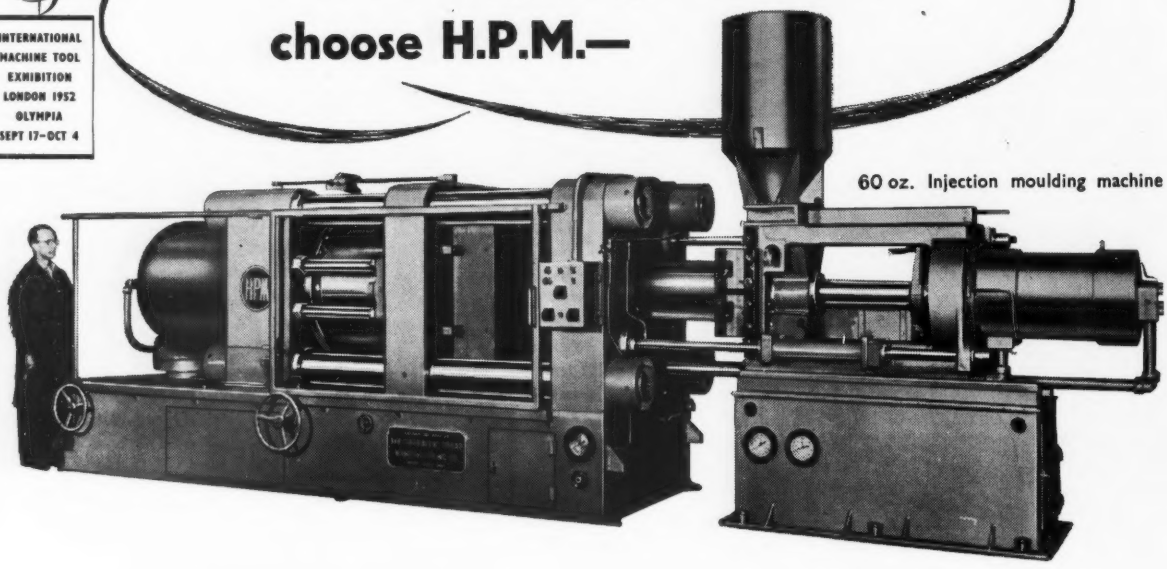
The leading "big" moulders choose H.P.M.—



60 oz. Injection moulding machine

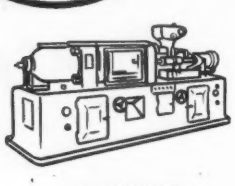
— and here's why

Injection moulders like the 60 oz. H.P.M. for big jobs . . . the power system is out in the open for easy accessibility . . . There's plenty of clamp pressure (1,000 tons) . . . big mould space (40" x 60") . . . lots of daylight (60") . . . and enough stroke for those deep draw jobs (36").

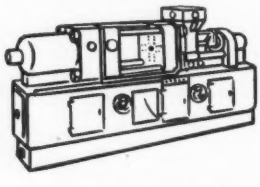
These big H.P.M.s are setting new records in rapid production of big refrigerator parts, radio and television cabinets, automobile mouldings, etc.—that's why so many have been installed.

Regardless of your moulding job, whether it requires a 9 or 60 oz. machine, investigate the many outstanding features of H.P.M.s all-hydraulic design; write for full details now.

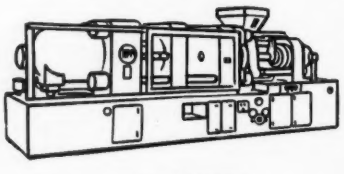
BRITISH HPM BUILT



9 OUNCE



16 OUNCE



32 OUNCE

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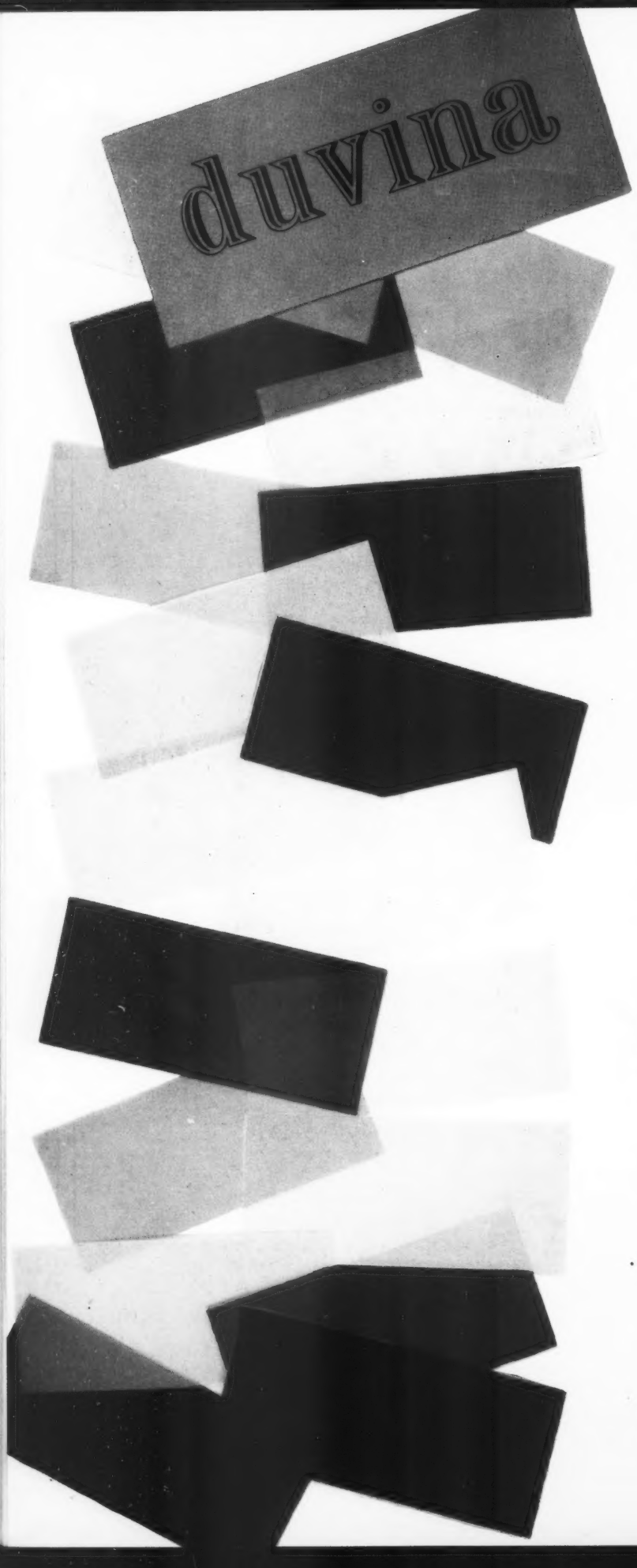

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A fine, new, supple material with a soft, dry, silky 'handle'.

*

Has great strength and tear resistance with excellent high frequency heat-sealing properties.

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Is easily and economically worked, cuts and sews well, lies flat on the work bench and drapes beautifully in wear.

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Colours are stable and the range is extensive and attractive.

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By introducing Duvina, Dunlop has raised p.v.c. sheet to a quality level which will justify its inclusion in the category of those staple products which are accepted by all and are in constant demand for a very wide range of uses.

MADE TO B.S.I. SPECIFICATION No. 1763

The illustrations on the front page show the effective results which can be obtained by printing Duvina.

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Light, flexible Duvina makes attractive rainwear for the whole family. Duvina always stays supple and never fades.

APRONS Pretty aprons in Duvina of all colours are practical and hard wearing.

BABY PANTS AND BIBS

Hygienic, sponge-clean Duvina makes serviceable pants and bibs for babies.

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DRESSING TABLE DRAPES

Fresh and beautiful drapes are easily made by swift, inexpensive heat-sealing methods.

NURSERY MATTRESS COVERS AND DRUGGETS Hygienic, not harmed by soiling—sponged clean.

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Colour fast—sponged clean in a moment —nice to touch.

BEDSPREADS

In translucent, opaque or printed Duvina...always clean ... always bright ... save laundry bills.

WINDOW AND SHOWER CURTAINS AND BATH CAPS

Curtains of Duvina achieve charming effects. Heat-sealing ensures easy making-up. Sponging removes all dirt.

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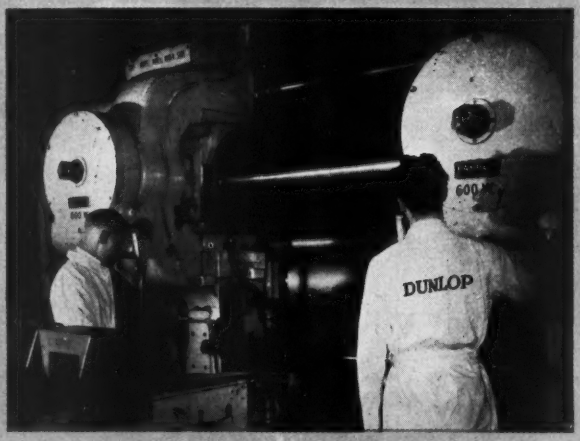
The Story of duvina *

THE NOVEL PROPERTIES of flexible plastic sheeting, based on vinyl resins, have established these materials as useful and attractive for the manufacture of a wide range of products. As with all new materials however, it has taken time for the necessary techniques of manufacture and manipulation to be perfected. The problems involved are closely related to those of the rubber industry so it is natural that Dunlop, with over sixty years' experience in this sphere, should undertake the development of rubber-like plastics. Duvina, manufactured by Dunlop Special Products Ltd., is the result of a long period of research and development and this product, made on modern plant specially designed for the job, carries with it the highest reputation for quality.



Quality in plastic products is associated primarily with the intrinsic properties of the material, but equally important are the uniformity and reliability of bulk quantities. Developments during the past few years show that Dunlop Special Products Ltd. offer a new standard of quality and reliability by which these new materials may be judged. Uniformity is assured by careful testing of all raw materials and precise, continuous control of the production plant at all stages. In addition, every product is tested for conformity to specification at frequent intervals. Dunlop experience in the rubber field has enabled all up-to-date devices for automatic control and recording of processes to be installed on the Duvina plant. Dunlop, leaders of progress in rubber, will provide through Duvina the standard of progress in the development of the newer flexible plastics.

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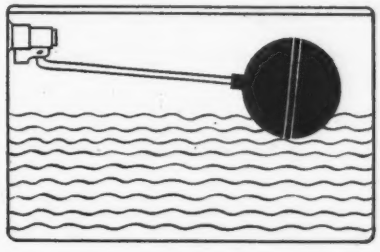

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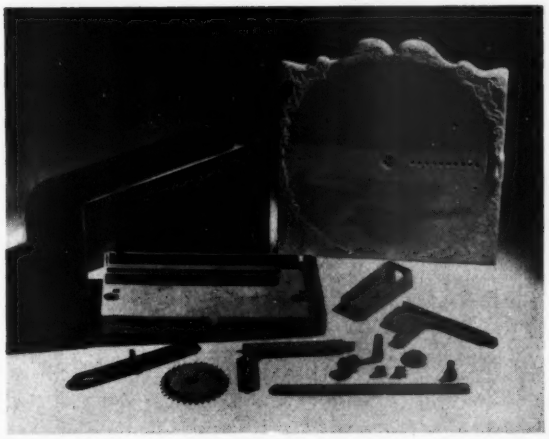

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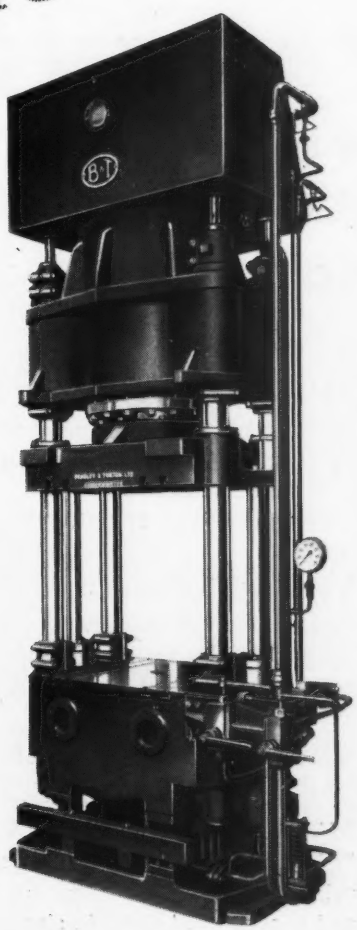

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EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

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Sr. Dante Tartaglia (left), technical director of Broadcasting Services in Uruguay, inspecting a lampshade made on a 48-oz. injection moulding press at the works of E. K. Cole Ltd., Plastics Division, Southend-on-Sea. Also seen are Mr. H. Alison, who acted as interpreter, and Mr. M. Oxenford (centre), both of the Ekco Export Sales Department.

BM163

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Plastics

VOL. XVII. No. 178. MAY, 1952

EDITORIALS

British Industries Fair

THE year 1952 will be, so far as plastics exhibitions are concerned, much less busier than 1951 with its Festival of Britain, its British Industries Fair, and its British Plastics Exhibition. The B.I.F. holds the field this year, and in spite of some confusion as to the outcome of the arguments over "whether to join in or not," one thing is quite clear: that instead of a diminishing number of exhibitors in the Plastics Section, the number has, at least at Earls Court, increased from 43 in 1951 to 56 in 1952. The number of member firms showing at the British Plastics Federation stand has also increased from 23 to 29. Some few have preferred to return to the older system of maintaining a separate stand—one company has exhibits both within the Federation stand and without. We welcome the newcomers to the Fair: Dunlop Special Products, Ltd., Kingsland Steam Joinery Works, Ltd., The Leathercloth Co., Ltd., Plysu Products, Ltd., Playfab, Ltd., E. Shipton and Co., Ltd., and Tufnol, Ltd. (who have come from Castle Bromwich). We also are pleased to see the return of Commercial Plastics, Ltd., Hornflowa, Ltd. and Rubber Improvement, Ltd.

We welcome especially to the Earls Court Plastics Section the stand of the Ministry of Supply, a move which enhances the prestige of the whole industry, and indeed is a significant indication of the part plastics are playing, not only in industry but in solving some of the problems of the Services. The corner-stone of this exhibit is the full-sized delta-shaped aircraft wing built by the Royal Aircraft Establishment from "Durestos" felt. Workers in the U.S.A. in the field of reinforced plastics for aircraft appear to have concentrated solely on the glass-fibre polyester resin type of structure. We in this country are examining both forms and from the pronouncements of Mr. J. Gordon (see "Plastics," October, 1951, p.277) following the exhibit of the wing last year, he and his co-workers have reason to believe that the special phenolic-asbestos felt they have employed in the structure of the delta wing possesses advantages both in quality of the wing and in the technique of its building. In other fields of large scale forming, both phenolic asbestos sheet and glass-fibre polyester structures have been used or suggested for making boats and motorcars. Both these materials have indeed created the new situation in which very large structural units are possible for the first time in the history of our industry. We are grateful that the Ministry of Supply has placed the wing on exhibit in the middle of the Plastics Section. It will arouse world-wide interest and draw more visitors, we should imagine, than ever before.

At the Castle Bromwich section of the Fair, it seems a truth, as we felt some years ago, that all the exhibits of plastics machinery are being concentrated therein and almost completely drawn away from London. Eleven of our biggest moulding machine constructors for the compression, injection and extrusion processes, and many mould and tool makers, will be exhibiting their products, as will many builders of ancillary plant and the well-known moulders in or around Birmingham.

In all, while the past few months have seen a recession in business, yet the position in many directions is very promising. Most noteworthy in the continuing shortage of metal and with the increasing availability of most plastics, is the fact that more manufacturers than ever are examining such plastics as are to them new materials. Especial exhibits promised in this field are road and traffic signs, a new oil-lamp body, household water-heaters that we have already noted in these pages, new counting machine bodies and the like, spray-guns and many others. Many of these are so excellent in production, design and use that there is little likelihood of any return to metal.

Overseas buyers, if acceptances of invitations are a guide, will visit the country in greater numbers than ever. Some 20,000 have promised to do so.

Glass-Fibre/Resin Convention

OUR reference in the previous editorial on the delta-wing throws emphasis on what might prove to be a technical battle royal between the two new reinforcd resin structures —the phenolic/asbestos type and the glass-fibre/polyester type. Both are remarkable materials with very high strength-to-weight ratios, and as we have already indicated, both open up new fields for the plastics industry. Indeed the fields already entered or examined appear to be the same in both cases as we have already described: in aircraft, in motor-car construction and in the building of boats; in addition, surgical units have been fabricated from each type with success. In the U.S.A. the glass-fibre reinforcement is also used for manufacturing suitcases, fuel tanks, roofing, chairs, vacuum cleaner parts, washing machine components and fishing rods, to mention but a few.

It is therefore of special interest to announce that on May 13 and 14 a glass-fibre/resin plastics convention will be held at Ashborne Hill, Leamington—the first of its kind in this country.

The purpose of the convention is objective discussion on the widest possible basis of the manufacture, application and future of these new structural materials. Unfortunately only 160 people can be accommodated but the organizers—Fibreglass, Ltd., in their capacity as the largest British manufacturers of glass fibres—have taken great care to ensure that the invitations are as representative as possible. There will be delegates from all glass-fibre manufacturing firms, from resin manufacturing firms and from research departments of industry and the Services. Sir Hugh Chance—Chairman of Chance Brothers, whose optical and other special glasses are known all over the world—will preside. From America Mr. Clare Bacon, manager of the Plastics Section of the Research Development and Engineering Laboratories of the Owens-Corning Fibreglass Corporation, is coming over to read two papers: one on: "Methods of Manufacture in the U.S.A." and the other on: "Applications of Glass/Resin Laminates in the U.S.A." From British experts there will be papers on manufacture of resins, glass-fibres and glass/resin products. No doubt there will be a large number of new fabrications to whet the appetite of even the knowledgeable. We hope to publish the papers in a forthcoming issue of this journal.

Expanded Plastics in the Tropics

THE effect on plastics of the climatic and other conditions existing in the tropics became a subject of special study during the last war and resulted in a number of reports, suggestions and, finally, methods for their protection.

With the increase in the range of types of plastics and in the number of forms in which they are available, the Ministry of Supply/British Plastics Federation sub-panel has arranged a programme of work designed to assess the performance of a wide variety of plastics—the data obtained to be used for the drafting of specifications for materials to be employed under tropical conditions by the Services and industry.

The first of the reports, that on "Expanded Plastics" (the time of exposure was six months, compared with two years for other types) has now been published and may be obtained from H.M. Stationery Office, price 1s. 6d. net. The results are extremely interesting and will prove of real basic value.

The trials were carried out by the Tropical Testing Establishment in Nigeria on ten samples of expanded forms of each of the following: phenol-formaldehyde resin, cellulose acetate, polyvinyl formal and urea-formaldehyde resin, the samples being 6 ins. square but of varying thicknesses. Three samples of each were distributed to each of three different types of exposure: jungle undergrowth, open desert and termite attack.

As a control, the remaining sample of each was kept in a box with silica gel, the latter being replaced weekly.

The results of such exposures is very interesting. The phenol-formaldehyde sample showed the greatest resistance to all the varying conditions, while cellular urea-formaldehyde resin showed least resistance with excessive crumbling and general disintegration. Expanded polystyrene and expanded polyvinyl chloride remained fairly sound after the trial, but the former showed excessive surface pitting as a result of sand abrasion at the desert site (it should be pointed out that each of the expanded plastics possesses a smooth outer skin, that is the cells are exposed on the cut sides of the samples, but are not exposed on the outer surfaces). Some showed excessive warping. It is surprising to note that in the termitary, the only plastic material entirely free from attack was expanded cellulose acetate, although only the urea-formaldehyde sample was severely attacked by termites. As for attack by fungus, all samples exposed were found to be contaminated, but there was no evidence of damage from this cause.

The report clearly shows the resistance of each sample under what might be called typical tropical conditions, but since we are dealing here with expanded plastics, it may be pointed out that the sole uses (other than for structures that float in water), so far as we know, are as insulators against heat or cold, or as cores for introducing lightness. This being so, expanded plastics will almost certainly be protected by, and fixed to exterior surfaces or structures, so that results in practice would perhaps resemble somewhat those found on the controls kept in boxes in the presence of silica gel. The report notes these results which indicate "little change" in the case of urea-formaldehyde, "no change" in the case of phenol-formaldehyde and small-blisters and coloured stainings in the other samples. Finally, it might have proved useful to have treated one set of samples with a fungicide and proofing against termites—this is possible without any loss of thermal insulation properties.

Moulding Powder and Shot

Paul Temple's On to Us

I'm not sure that this is not a matter for the British Plastics Federation or the Society of Chemical Industry (Plastics and Polymer Group), but Scotland Yard and, what is far worse, Paul Temple both have their hawk-eyes on us. The strip-cartoons in the "Evening News" of April 1 and days following, contain the ominous news that they are after a Mr. M.B., who, Paul discovers, runs a plastics factory and is also a considerable punter (anglicè, he backs horses). As a result of his heavy betting, M.B. owes £25,000 to somebody who says he doesn't mind accepting an equivalent interest in M.B.'s factory—dirty dog! or should I say, what a mug! The dreadful thing is that one of the Big Five or Six at Scotland Yard has discovered that M.B. "has a science degree but no criminal record." That a man with a science degree should have no criminal record is probably a phenomenon, but—watch out, England—we're being got at! I only hope that nobody asked Paul Temple to the Federation lunch.

* * *

Hard and Soft Soap

I have a special, but probably unwarranted, bias against laundries in general, and my own steam laundry in particular. I know steam and other raw materials have gone up in cost, and so have the teeth on those special tearing machines, but my shirt and two collars now cost me 1s. 9d. to wash. I am not at all keen on wearing a horse-hair shirt, but I've half a mind to ask Fothergill and Harvey, Ltd., of Manchester, who weave a synthetic equivalent from a vinyl copolymer, to make me one to measure. We already have hard p.v.c. collars, so roll on the nylons and terelenes and tygans and vinyons and rilsans; to Limbo with all laundries! All this outburst on receiving a note and the accompanying picture from my old friends the Canadian National Railways, who obviously have similar opinions about laundries. Mr. Eric Humphries, Public Relations Representative in this country, tells me that the colourful vinyl copolymer fabric headrests seen on the seats are now in use in parlour and café cars on trains Nos. 48 and 51 between Montreal and Ottawa, accentuating the cars' harmonious decorative themes with their colours of blue and silver, green and silver and wine and silver. A permanent part of the chair, they are cleaned and disinfected with a detergent, eliminating the necessity of sending the tidies to the laundry, as was done with the linen ones. Also, because of their vastly longer life, replacement costs are lowered. The headrests are being put on all 1,740 seats in parlour cars on the system. As soon as Mr. Churchill acts, I am sending this news to the chiefs of the London Midland and Scottish, the Great Western, the Southern, the London and North Eastern, and even to the London, Chatham and Dover Railways.

DOGSBODDY.

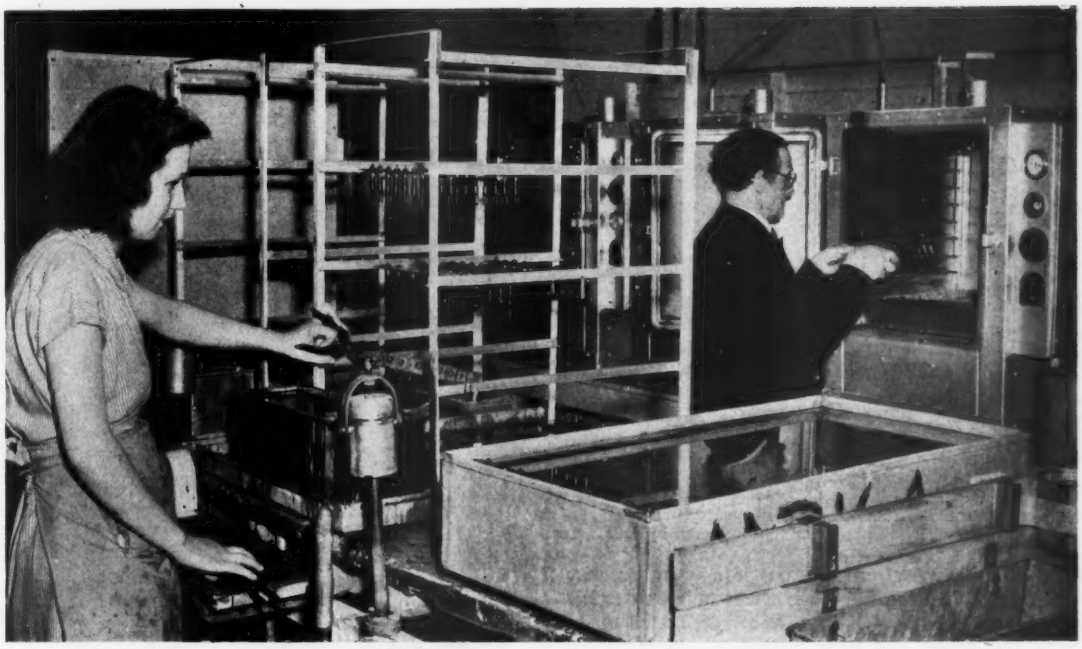


Fig. 1—Dipping formers in p.v.c. paste; draining racks behind dipping tanks, and heating ovens in the rear.

Progress in Dip-moulding with P.V.C. Paste

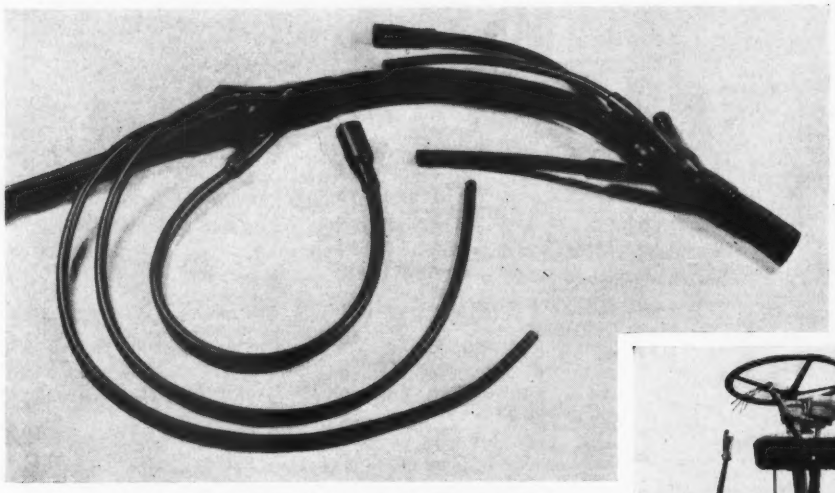
THE process of dip-moulding in polyvinyl-chloride paste may be said to have begun industrially during the past war, but has since expanded considerably in many fields. In very general terms, it is undoubtedly derived from the 25-year-old method common to the rubber industry using latex, the milk-like exudation from the rubber tree consisting of fine particles of rubber emulsified in a watery continuous phase; synthetic-rubber latices are also available, both being widely employed for making a variety of technical and non-technical applications: tyre and belting dips, adhesives, paper and fabric impregnation, can sealing, balloons and other toys, latex thread, foamed-sponge, upholstery hair-coating, foamed-sponge gloves, etc. In this technique, the pure rubber is deposited while the water is completely removed.

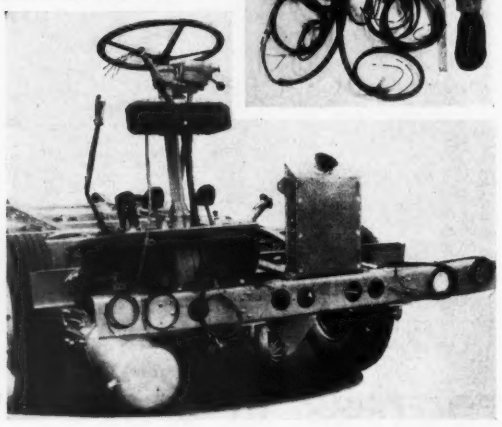
P.v.c. pastes, however, differ considerably from latices, being dispersions of p.v.c. in organic solvents of low volatility (liquid plasticizers), the latter being retained and forming an essential part of the final solid structure. The primary requisite of paste is obviously, for the process in view, one of viscuous fluidity, the condition being obtained by carefully controlled mixing of p.v.c. and plasticizer until the required viscosity is reached. In practice, the proportions of the two ingredients may vary as desired, the paste containing between, say, 30 per cent. to 50 per cent. of plasticizer. The second requisite is that this paste on heating to between 150-160 degrees C. should, by complete "fusion," be converted into a still more homogeneous mass—the solid-gel form. It will be obvious that upon the proportions of the constituents of the paste (these may also include stabilizers, pigments, etc.), and upon the temperature and period of heating, will depend the hardness and mechanical properties of the gelled material.

The dipping process thus consists of immersing a preheated former in the fluid paste, allowing excess to drain off, and then heating under the required conditions. On cooling, the solid coating is removed by stripping.

It is interesting to note, at this point, that it is widely considered that the use of p.v.c. pastes was merely an extension, by using increased plasticizer content, of the more widely known polyvinyl chloride/plasticizer mixtures used for making sheet and foil. There does not seem to be much difference in time when each began, but from the scientific point of view it is highly probable that the pastes were, in fact, the earlier products—at any rate in the laboratory. They were certainly the direct derivatives of the intensive work

Fig. 2—Waterproof sleeves, the two examples in the rear with 16 and 8 legs respectively.





Figs. 3, 4 and 5.—Complete cable harness and application of the system on Mark IV passenger vehicle chassis by A.E.C., Ltd.

carried out on the physical properties, especially by viscosity measurements of solutions of high molecular-weight materials which began with gelatin, rubber, nitro-cellulose, etc., up to the modern polymers. All these experiments were carried out more frequently than not, at considerable dilutions. We might add that the study of this group of polymer/solvent or polymer/plasticizer dispersions or emulsoids, as they are sometimes called, is one of the most difficult in the field of physical chemistry, and that the manner in which the knowledge gained has been translated into production of pastes that are now of highly consistent viscosity and concentration and almost trouble-proof to the users, reflects great credit on the raw-material manufacturers.

As much credit may be given to the few early users on the industrial scale who, working with dispersions of resins that

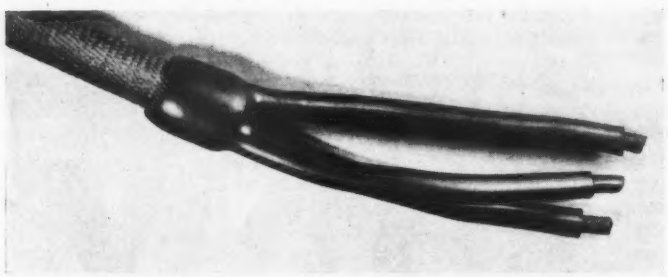


Fig. 6.—Sleeving with lengthened "legs" for cable protection in film studios.

Fig. 8.—Distributor cover for motor car.

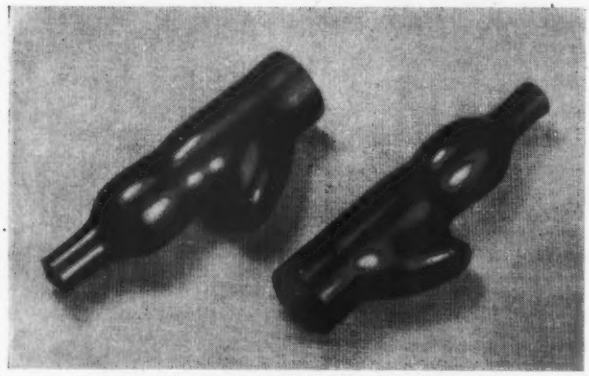


Fig. 7.—Insulation covers for "crocodile" clips.

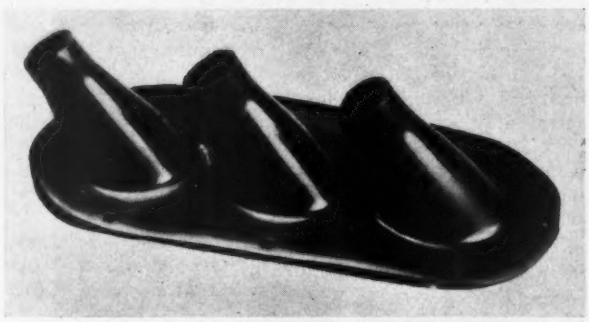


Fig. 9.—Waterproof sealing for aircraft aerials.

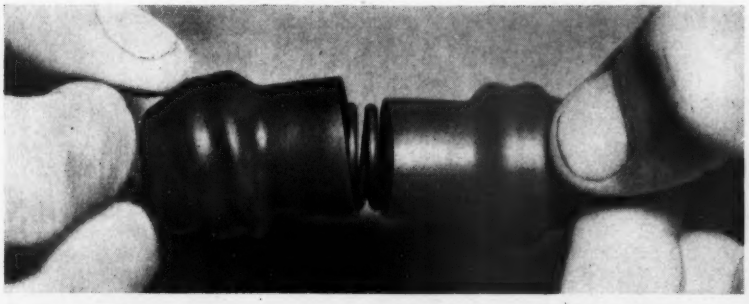


Fig. 10.—Two-part cover to protect a spring from contamination.

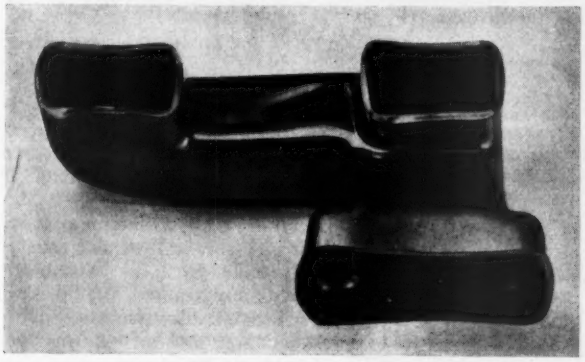


Fig. 12.—Hot-air duct connector for radar equipment.

had no counterpart in Nature or in industry, nevertheless saw their possibilities and succeeded in absorbing the complicated technology of their proper employment.

Among the earliest of these was Hellermann Electric, Ltd., who first began dip moulding in the year 1943. Primarily interested in matters electrical, the new process was employed specifically in the sphere of protection of cables, their jointing, distribution and identification. Prolonged preliminary examination of p.v.c. and its various forms convinced them of the excellent properties of the new elastomer: good dielectric

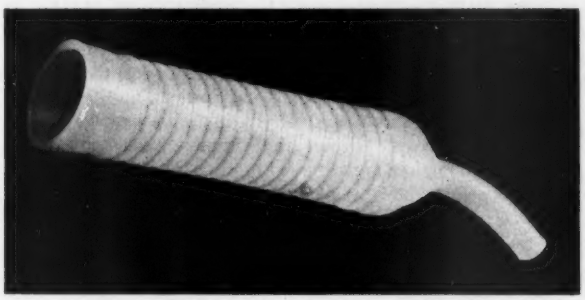


Fig. 13.—Hair drier handle grip.

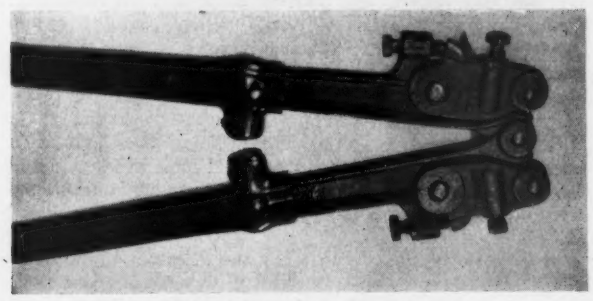


Fig. 14.—Insulation for lever handles of bolt cutters.

Fig. 11.—Rectangular " bellows " for London Transport train stop trip arm.

strength, hardness and rigidity that could be varied within very wide limits, exceptional resistance to water, oil and acids, flexibility at low temperatures, abrasion resistance, ability to make excellent seals under pressure, weldability, resistance to sunlight and good ageing properties.

The modern extensive plant at Tinsley Lane, Crawley, Sussex, produces a somewhat bewildering range of dipped mouldings, and it may be sufficient to confine these notes to a description of some few of them.

Typical in the field of electric wire and cable protection for aircraft and road vehicles are the sleeves shown in Fig. 2. To

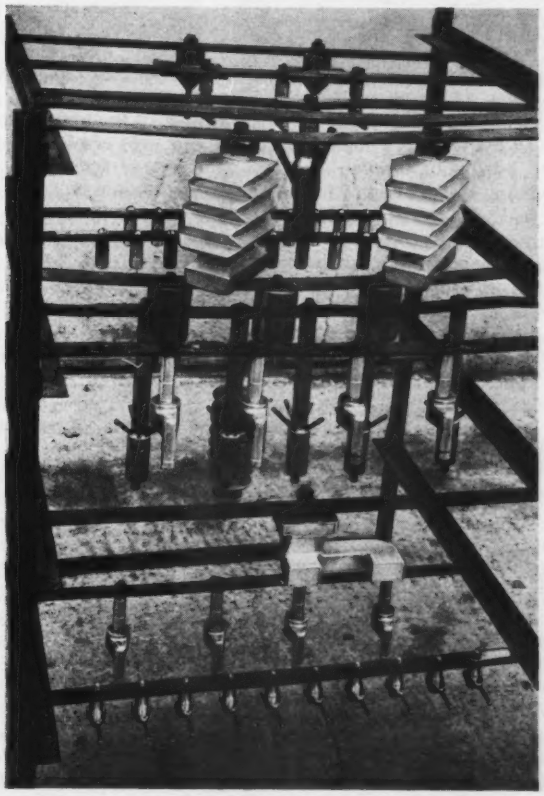
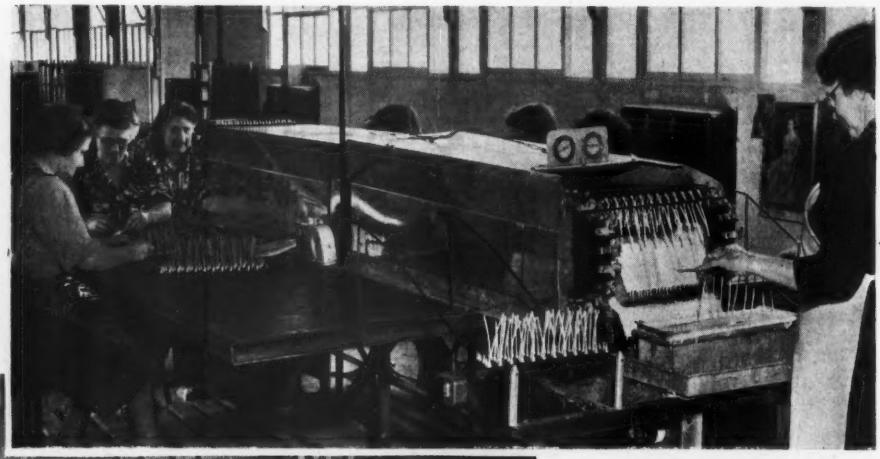
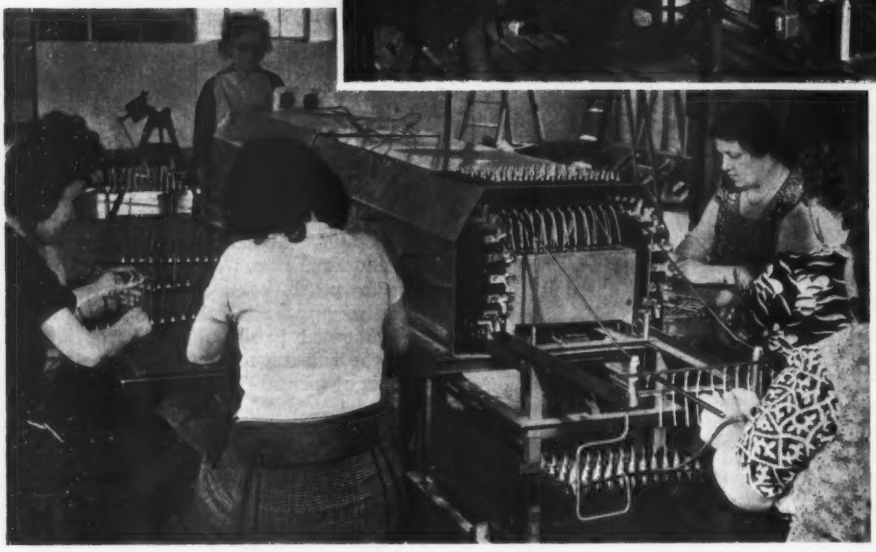


Fig. 15.—Store-rack holding aluminium and plated steel formers.





Figs. 16 and 17.—Production of cable markers by dipping in p.v.c. emulsion and drying in a tunnel with infra-red heating. (Right) Dipping in progress at entrance to tunnel. (Below) Markers emerging from tunnel.

take the eight-way sleeve seen on the right of the photograph as an example, any number of leads up to eight can be passed for distribution through the " legs," the ends of which are cut to admit them. Each " leg " thus forms a tension fit which is a seal. A more complicated system of a complete cable harness is seen in Fig. 3, when two large sleeves are employed at two points, three cables being distributed at each. By this means the shrouding of cable-looms of great complexity in an oil-proof, petrol-proof and water-proof cover is readily achieved, reducing faults in electrical systems to a minimum. The actual application of such a system is seen in Figs. 4 and 5, where is shown an assembly on a Mark IV passenger vehicle chassis manufactured by A.E.C., Ltd., of Southall.

Other typical examples in the electrical field and applied to a variety of industries are seen in Figs. 6, 7, 8 and 9.

Fig. 6 shows a sleeving with greatly lengthened " legs " for use in protecting cables in the cinema industry, where lighting and power cables are unavoidably dragged over studio floors. In this and other instances, the tapered or lower-radiused soft p.v.c. makes a perfect seal with the cables, especially when the latter are under tension. Fig. 7 shows an insulation cover for a " crocodile " clip. Fig. 8 is a car distributor cover and Fig. 9 shows a waterproofing seal for aircraft aerials. In the more general industrial field, we have the examples seen in Figs. 10, 11, 12, 13 and 14, respectively, an ingenious two-part cover to protect springs from general contamination; a rectangular " bellows " for London Transport train stop trip arm; a hot-air duct connector on radar equipment; a hair-drier handle grip; and insulation for the lever handles of a bolt cutter. The industrial applications of dipping, indeed, are growing rapidly.

Production by the Dipping Process

While the process of dip coating is, theoretically, quite simple, in practice great care and close control are required at all stages. An intimate view is obtained by examining the section in the factory devoted to experiment, to prototype production and other special small-run dippings. In principle exactly the same methods are applied when producing large mouldings.

In Fig. 1 is seen the dipping tank in which the paste is maintained at a constant level from a hand-pump worked by the operator. The pump is fitted with filters, to exclude the possibility of agglomerations, air bubbles, etc. The formers are suspended on a rack and are dipped into the paste by the operator to a predetermined depth. At this point it is worth while noting that most formers are of aluminium alloy; a range of them is seen in Fig. 15.

In general, a short preheating period is given to the formers at 105 degrees C. After dipping, the formers and their coatings are removed and allowed to drain, the excess paste in the draining tank seen beyond the dipping tank, and when drainage is complete are removed on their racks to the heating ovens seen in the rear, where they are heated at 150 degrees C. Obviously such temperatures and periods vary according to the speed of production required and to the thickness of the deposition. As most thicknesses produced in the factory are of the order of 60/1,000 in., the above temperatures may be considered general. On removal from the ovens, the racks are placed into a cooling tank of water and the mouldings finally stripped and passed to the inspection bays for testing.

An interesting method of dipping in p.v.c. is met with in the production of cable markers, which consist of short lengths of p.v.c. marked with numerals that have been printed on them. In order to protect the printing, it is necessary to coat them with a transparent protecting film. This process is carried out on a special plant using a p.v.c. emulsion. In Figs. 16 and 17 the markers, fitted to rails, are dipped and hung on the teeth of a moving conveyor passing through a drying tunnel heated by infra-red rays.

Finally, we should like to thank the directors of the company, Mr. J. Bowthorpe and Mr. R. A. Parsons, for their permission to visit the plant, and Mr. Whyte and Mr. Bernheim for their help in compiling the above notes.

Multi-way P.V.C. Tubes for Gases and Liquids

Seven-way and two-way "Pigemultiflo" tube assemblies.

AS an alternative to metal tubing for conveying gas, air, or clean liquids over a distance, single tubes of p.v.c. have found increasing application, for such tubes combine mechanical flexibility with resistance to oil, moisture, and various acids and alkalis. Tubing of this kind has been supplied by Pirelli-General Cable Works, Ltd., for many years.

This tubing is now available in multi-way form for situations where the laying of an assembly in long lengths has technical and economic advantages over the separate installation of single tubes. "Pigemultiflo" tubes (Brit. Pat. No. 627,031) are laid up in the form of a cable with the interstices filled with jute wormings. The standard size of tube adopted is ¼-in. bore with a wall thickness of 0.060 in., but ⅛-in. bore tubes with the same wall thickness are available. At present assemblies are available with seven ¼-in. tubes and fourteen ⅛-in. tubes, and the maximum manufacturing length is 500 yds. Colour distinction is made by the use of red, white and black tubes, and where necessary by a coloured longitudinal line on a base colour.

A sheath of p.v.c. is normally applied, and where the possibility of mechanical damage is present, or the assembly is to be carried in cable hangers or cleats, single galvanized-wire armouring is desirable. This is applied directly to the p.v.c. sheath, and where again protection of the galvanized-iron wire against corrosion is necessary, an external, compounded jute serving or hessian tape is applied overall. To distinguish these tubes from electric cables having a similar appearance, they can be supplied with a red p.v.c. sheath.

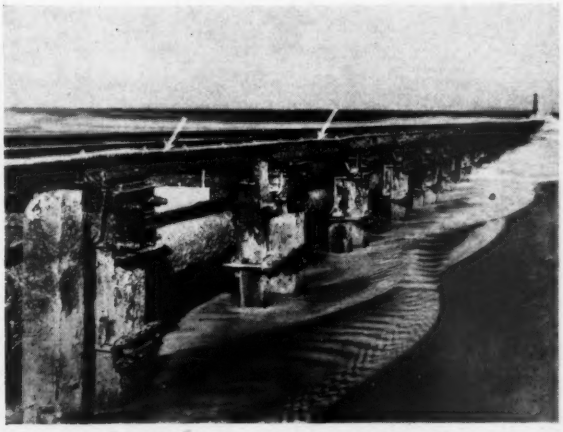
"Pigemultiflo" tubes were originally developed for instrumentation purposes, using dry air at pressures up to 35 lb./sq. in. gauge, and they are accordingly tested individually at 50 lb./sq. in. before being laid up. Developments now in progress to reinforce the single tubes will render them suitable for pressures up to 200 lb./sq. in. Joint boxes and terminations are similar to corresponding boxes used for electric cables, complete with cone clamps for armoured assemblies.

The first commercial installation of these p.v.c. tubes was put into service in 1946 in connection with an extensive, instrumentation system at a chemical works on the north-east coast. In order to indicate water levels at sea-water process pump intakes, especially at night and at times when the actual sea conditions cannot be estimated visually, armoured "Pigemultiflo" tubes are taken 300 yds. out to sea along two jetties. They connect the central control-room instrumentation, which includes sea-water level indication, water flow and tide gauging, to the submerged, depth-level apparatus at the sea ends of the jetties. Compressed air in the tubes bears on the sea-water surface, and the resulting variation of pressure gives the level indication at the control-room panel.

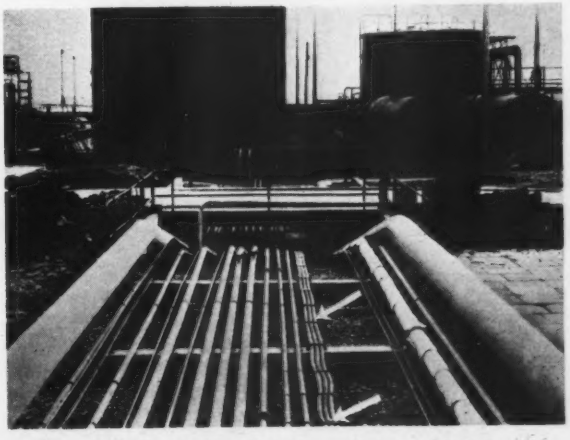
These assemblies are subjected to the full force of tides and gales and are submerged for 12 out of every 24 hours, yet the whole installation has remained in service without failure or leakage, and so far reveals no deterioration.

The methods of installation used are identical with those for electrical cables, but the p.v.c. tubes have the advantage of a much reduced weight in proportion to diameter. They can be buried direct in the ground, drawn through ducts, bound to a catenary wire, and carried on cable hangers or in cleats, either in air or water. A further major advantage is that, with the long lengths available, the frequent joints necessary in steel or copper pipe are entirely eliminated, thereby obviating these potential sources of leakage.

One of the important features of "Pigemultiflo" tubes is undoubtedly the virtual elimination of the risk of flattening by accidental mechanical damage, which is always present with metal tubing. This risk may be particularly serious at such points as the entry to a control room, where a number of tubes are adjacent and may be damaged simultaneously. Tests have shown that "Pigemultiflo" tubes have high resistance to flattening and are more robust than single metal tubes, for even if temporarily trapped they will recover on release.



"Pigemultiflo" assembly cleated alongside jetty.



"Pigemultiflo" assemblies cleated together at a chemical works.

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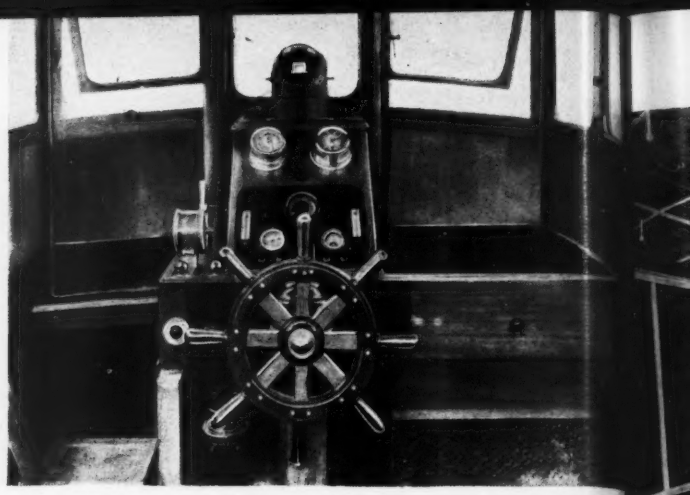
PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

28. Boats and Ships



(Above) One of the first issues of "Plastics" (August, 1937, p. 84) illustrated this yacht cabin fitted with a moulded wheel manufactured by Moulded Products, Ltd.

(Below) The E.W. Lightcraft 12-ft. launch manufactured by Eustace Watkins, Ltd., incorporates "Onazote"—expanded ebonite made by Expanded Rubber Co., Ltd.—in the hull for buoyancy, making it unsinkable, as this photograph shows.

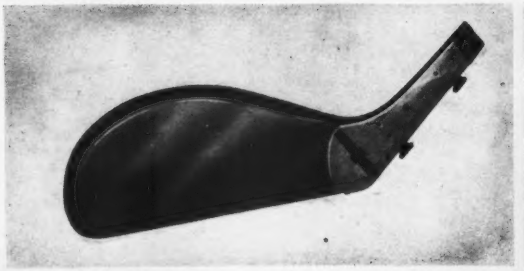
(Above) The 16-ft. sailing dinghy made by North East Coast Yacht Building and Engineering Co., Ltd., is the first boat made in Great Britain using glass fibre/polyester resin laminate to mould an integral hull and deck.

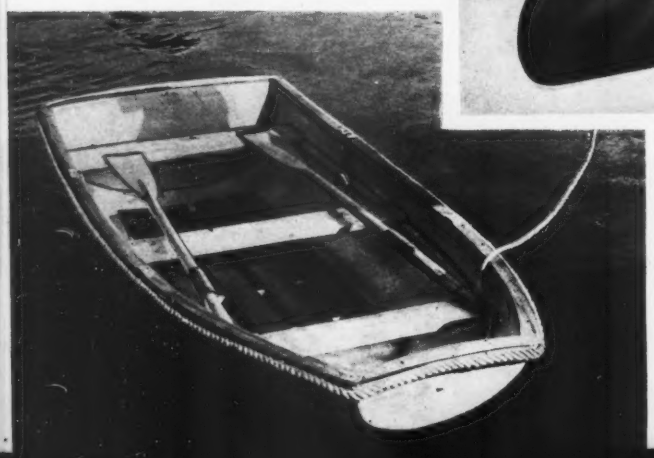
(Below) This recently introduced 12-ft. launch is made by W. and J. Tod, Ltd., from glass fibre/polyester resin laminates.

(Left) Components machined from "Tufnol" phenolic laminates are useful in boat and ship construction for their strength and corrosion resistance. This water-lubricated tailshaft bearing for a canal barge replaces a metal component. (Photo: Tufnol, Ltd.)

(Below) The 17-ft. "Swordfish"-type racing yachts are the largest of a series of boats by Fairey Marine, Ltd., constructed by a method dependent on veneers bonded by synthetic resin adhesives.

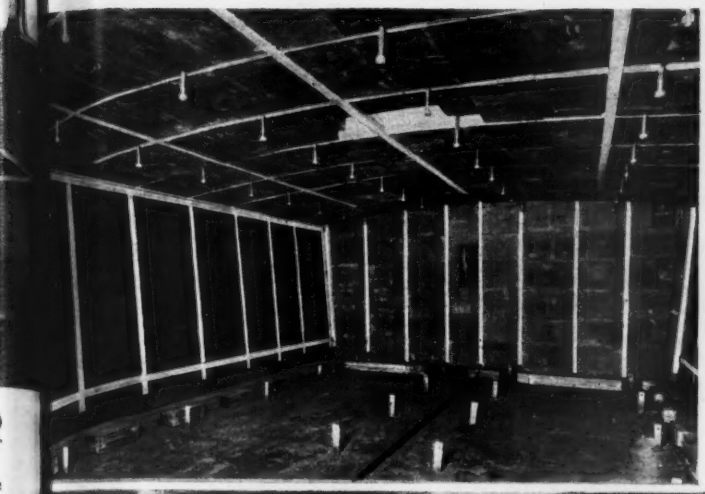
(Below) Another glass fibre/polyester resin boat which has proved successful in competition with conventional types is the 7 ft. 6 in. "Allday" pram dinghy made by Boats and Engines, Ltd.

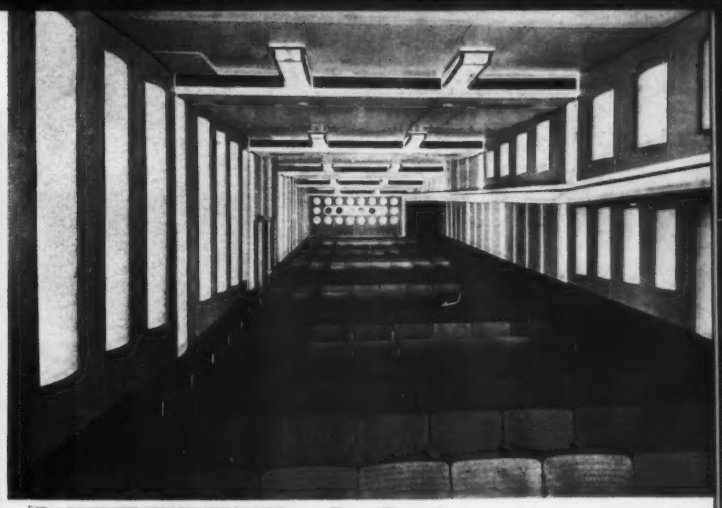




(Above) "Permali" densified wood laminate, made by Permali, Ltd., is the material used for this rudder blade for a 14-ft. day boat. Besides water resistance it has the advantage of great density, making the blade sink without weighting.

(Below) Thermal insulation for a refrigerator barge of the Anglo-Iranian Oil Co., Ltd., was fitted by Anchor Insulating Co., Greenwich, using "Onazote" expanded ebonite made by Expanded Rubber Co., Ltd.



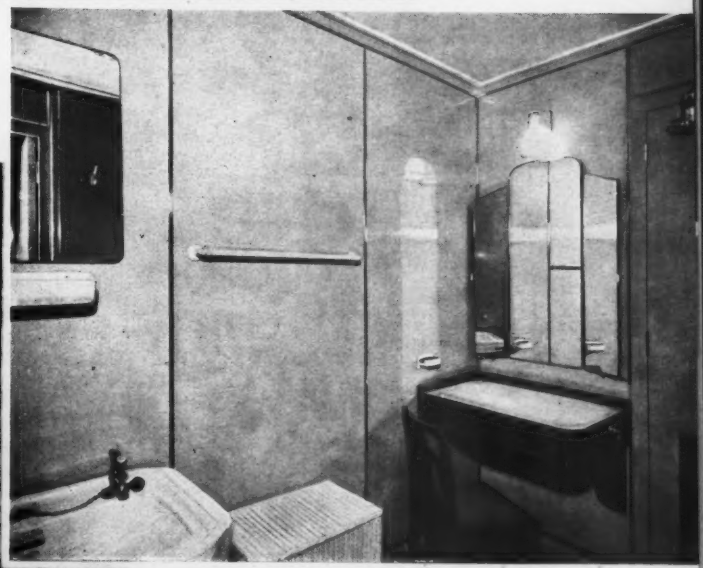


(Above) Walls, floor and acoustic ceiling panels of the first class cinema on the R.M.S. "Queen Mary" were fitted by Geo. Parnall and Co., Ltd., using "Holoplast" plastics panels and lining sheets. (Photo: Holoplast, Ltd.)

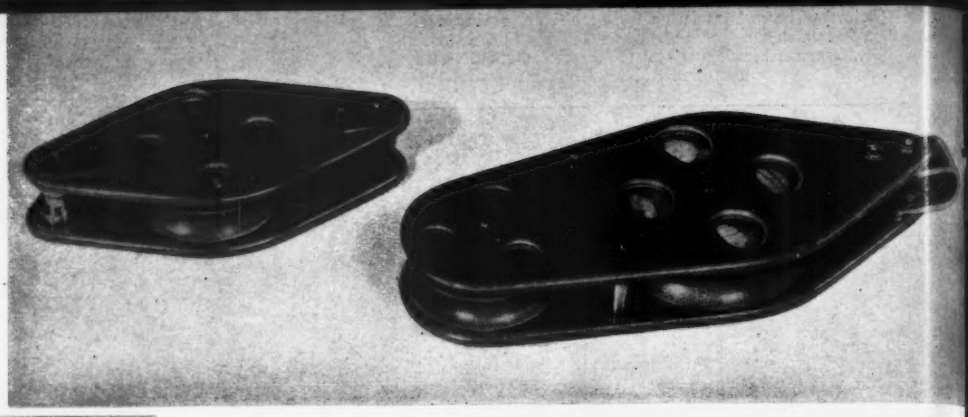
(Left) Panelling on the P. and O. liner S.S. "Carthage" is made of paper-surfaced "Weyroc" resin-bonded chipboard, manufactured by Airscrew Co., and Jicwood, Ltd.

(Above) "Holoplast" plastics structural panels and lining sheets were used by Caledon Shipbuilding and Engineering Co., Ltd., in the construction of bulkheadings, doors, etc. on M.V. "Wendover." (Photo: Holoplast, Ltd.)

(Below) The new Orient liner "Oronsay" makes extensive use of "Warerite" decorative laminates. The first class dining room shown here uses the material for the surfaces and shelves of dumb waiters, bar counters, etc. (Photo: Warerite Ltd.)



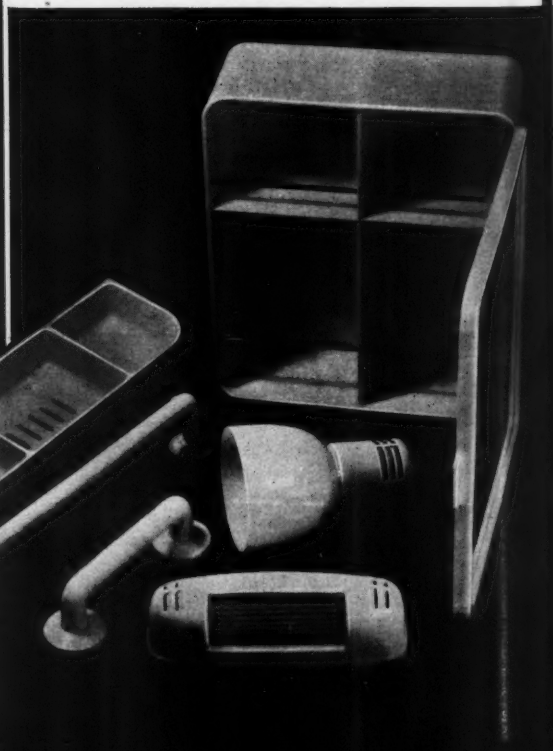
(Above) Attractive appearance, durability, ease of cleaning, are factors causing increased use of decorative laminates in all parts of ships. This ladies' powder room of the Bermuda Line ship "Ocean Monarch" has walls and table top surfaced in "Formica" made by Thomas De La Rue and Co., Ltd., Plastics Division.



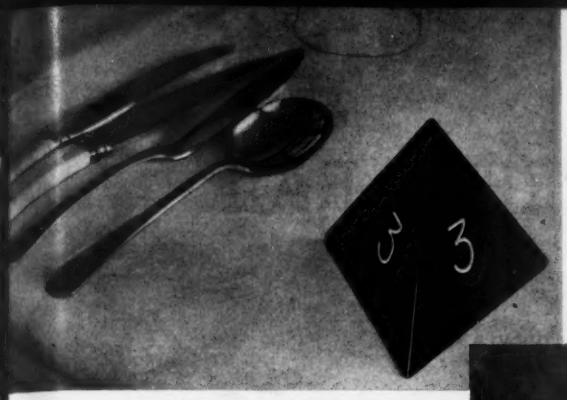
(Above) Sheet pulley blocks made from "Tufnol" laminates are suitable for use on boats as they are durable and do not corrode. (Photo: Tufnol, Ltd.)

(Above and right) These two ashtrays, moulded by W. E. Amies and Co. Ltd. from "Bakelite" phenolic material were specially designed for use in the Cunard liners, R.M.S. "Queen Mary" (right) and R.M.S. "Queen Elizabeth" (above).

(Above) This range of "Thermos" vacuum jugs, specially designed for individual ships and shipping lines are moulded by Roanoid Plastics Ltd.

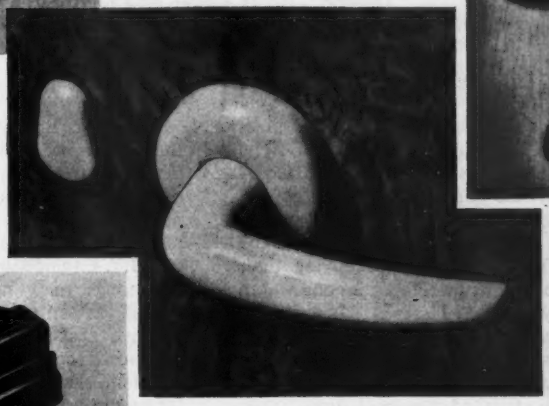


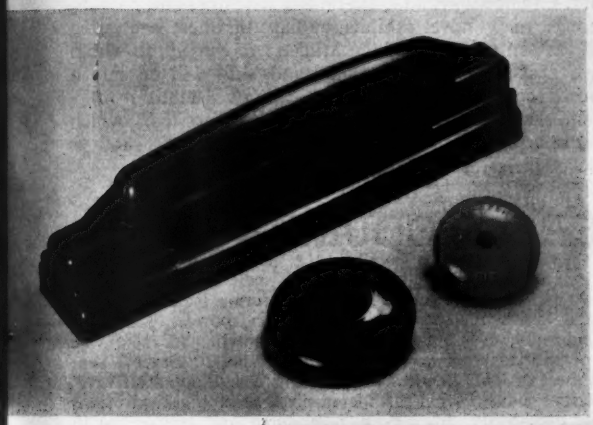
(Above and right) These photographs show a small selection from moulded fittings made by Roanoid Plastics, Ltd. for ships' bathrooms and cabins. Individual items are usually designed by the moulders in co-operation with the ships' designers, and often vary from ship to ship. Included here are mouldings for Cunard, P. & O. and Orient line ships.



(Above) Pyramid table markers, which are moulded in black phenolic material by Frederick W. Evans, Ltd., are used by several shipping lines. The handle and knobs (below) are moulded by the same company for valves and electrical equipment on ships.

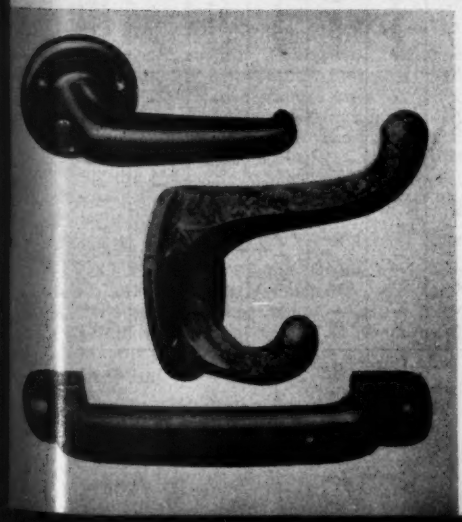
(Right and below) Moulded plastics door furniture and handles manufactured by Lacrinoid Products, Ltd., are used by ships fitters in the construction of many interiors.





(Right and below) Compactness is the main feature of the berth-light and the nesting tableware moulded by Brookes and Adams, Ltd., principally for use in yachts.

(Right) The "Norvent" air diffuser designed principally for marine air conditioning has a strong plastics housing moulded by the Bushing Co., Ltd.



(Left) A selection of plastics door and furniture fittings moulded by 'Evered and Co., Ltd., for general use as well as for ships.

(Right) The "Stylojet" marine air vent together with the phenolic components moulded by E. K. Cole, Ltd., used in its construction.

(Above) Sheet pulley blocks made from "Tufnol" laminates are suitable for use on boats as they are durable and do not corrode. (Photo: Tufnol, Ltd.)

(Above and right) These two ashtrays, moulded by W. E. Amies and Co. Ltd. from "Bakelite" phenolic material were specially designed for use in the Cunard liners, R.M.S. "Queen Mary" (right) and R.M.S. "Queen Elizabeth" (above).

(Above) This range of "Thermos" vacuum jugs, specially designed for individual ships and shipping lines are moulded by Roanoid Plastics Ltd.

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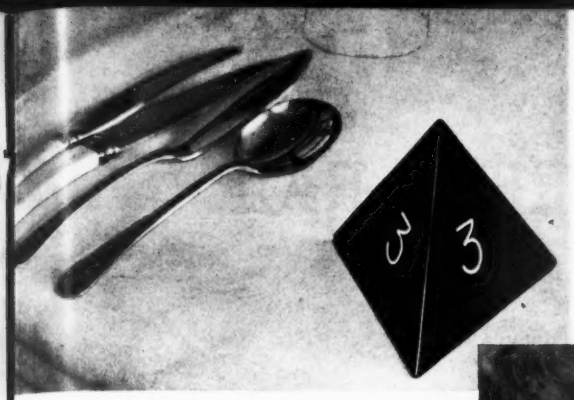
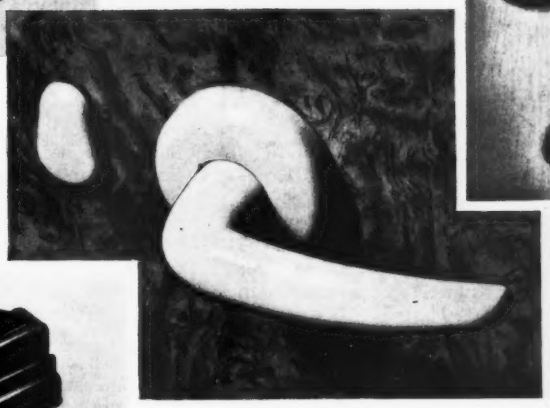
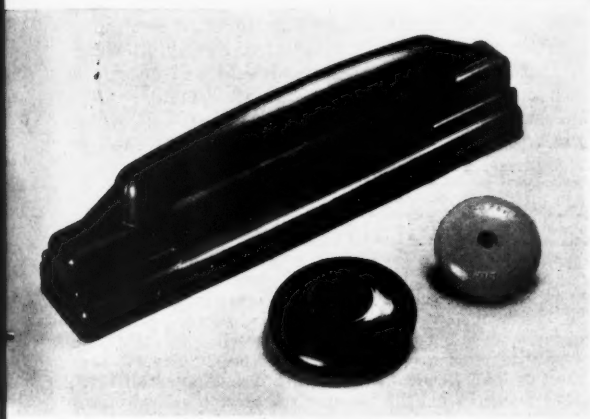


(Above) Pyramid table markers, which are moulded in black phenolic material by Frederick W. Evans, Ltd., are used by several shipping lines. The handle and knobs (below) are moulded by the same company for valves and electrical equipment on ships.

(Right and below) Moulded plastics door furniture and handles manufactured by Lacrinoid Products, Ltd., are used by ships fitters in the construction of many interiors.





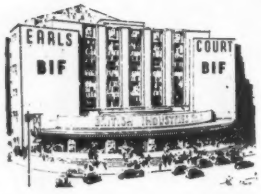
(Right and below) Compactness is the main feature of the berth-light and the nesting tableware moulded by Brookes and Adams, Ltd., principally for use in yachts.

(Right) The "Norvent" air diffuser designed principally for marine air conditioning has a strong plastics housing moulded by the Bushing Co., Ltd.

(Left) A selection of plastics door and furniture fittings moulded by Evered and Co., Ltd., for general use as well as for ships.

(Right) The "Stylojet" marine air vent together with the phenolic components moulded by E. K. Cole, Ltd., used in its construction.

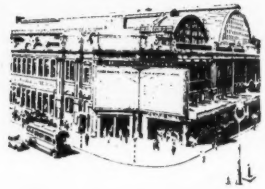
BRITISH INDUSTRIES FAIR



May 5-16

London: Earls Court and Olympia

Birmingham: Castle Bromwich



THE 1952 British Industries Fair is the sixth of the post-war period and the 30th occasion of holding it. The Plastics Section is again on the first floor at Earls Court and occupies almost exactly the same position as before. Here the total number of exhibitors has increased from 43 last year to 56 this year. Of this number 29 are on the combined British Plastics Federation stand occupying their own single stands. We welcome the newcomers, among whom are Plysu Products, Ltd., Playfab, Ltd., James North and Sons, Ltd. As before, a large number of companies ancillary to the plastics industry, e.g., those that make solvents, plasticizers, colours, control instruments and specializer plant, are exhibiting at Olympia. In addition, finished goods of many types incorporating plastics will also be shown at Olympia.

At Castle Bromwich, where almost all the machinery of the industry will be on view, some 30 companies will exhibit a variety of presses and components, including various types of compression and transfer machinery, injection moulding presses, extrusion machines, hobbing presses, preforming machines (a new horizontal type will be seen on the stand of B.I.P. Engineering, Ltd.), die-sinking machines and moulds.

Amongst many novel exhibits, perhaps the most interesting will be that on the stand of the Ministry of Supply, to whom we give a special welcome. On stand V.24 will be shown the most recent work of the Royal Aircraft Establishment—the delta-shaped aircraft wing made of "Durestos," which formed such an exciting centrepiece to the S.B.A.C. show at Farnborough last year.

PLASTICS SECTION—EARLS COURT

THE increasing number of exhibitors in the Plastics Section at Earls Court this year will emphasize the trend of the industry towards larger and more "technical" productions. Moulders, fabricators and material manufacturers are showing new exhibits which feature the importance of plastics to the whole of industry. Some of the largest compression mouldings and injection mouldings yet made will be seen on the stands, whilst the special aircraft feature by the Ministry of Supply shows the greatest advance made towards structural use of plastics. The expanding use of p.v.c. and other vinyl materials is also reflected here. The manufacturers of p.v.c. sheet and coated fabrics are joined by two manufacturers who make up these materials for use principally in protective clothing. The three tables on this and following pages have been compiled as a ready guide and reference to manufacturers of plastics raw materials, semi-manufactured products and finished goods and components. The indication of processes in Table 3 should be of particular interest to present and potential users of the trade services offered by the plastics industry. The exhibits and products of individual manufacturers are briefly described below. Twenty-nine of the companies in this section are grouped together in one combined stand organized by the British Plastics Federation, and, as in previous years, the displays will be in separate showcases; these exhibitors are indicated thus*.

BX Plastics, Ltd. (V. 2/11)

This double stand gives a comprehensive display of the range of thermoplastics made by the company. Together with "Xylonite" celluloid, "Lactoid" casein, and "Bexoid" cellulose acetate in forms including sheet, rod, tube and moulding powder, there will be shown for the first time: "Cobex," the new vinyl copolymer sheet; "Bexan," synthetic filament for brush filling; "Velbex," thin calendered p.v.c. sheet; rigid extrusions from p.v.c. compound; and acrylic rod in fluorescent colours for display and other purposes. Polystyrene in the form of sheet and rods for electrical work, polythene layflat tubing for packaging are among other products displayed.

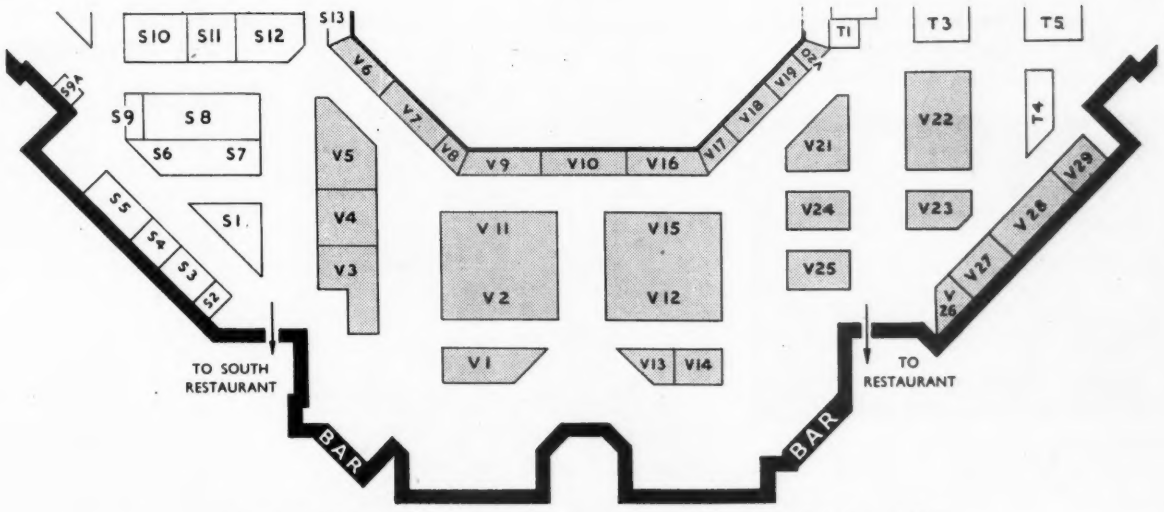
Bakelite, Ltd. ★

The main products of the company are moulding powders, liquid resins, adhesives and laminates based on phenolic and urea resins. Recent developments have led to the introduction of some new materials for

Table 1.—Plastics Material Manufacturers at Earls Court and Olympia. (Only primary producers of materials in the form of powders, resins, compounds, etc. are shown. Semi-manufactured products such as sheet, film or extrusions are shown in Table 2.)

Exhibitor	Stand No.	Casein	Phenolic plastics	Urea plastics	Melamine plastics	Polyester resins	Cellulose acetate	Other cellulose plastics	Polystyrene	Polyvinyl chloride	Other vinyl plastics	Acrylic plastics	Polythene	Polytetrafluor-ethylene	Nylon	Bituminous compounds
EARLS COURT.																
B.X. Plastics Ltd.	V.2/11	×	—	—	—	—	×	×	×	×	×	—	—	—	—	—
Bakelite, Ltd.	*3	—	×	×	—	—	—	—	—	×	×	—	—	—	—	—
British Geon, Ltd.	*20	—	—	—	—	—	—	—	—	×	×	—	—	—	—	—
British Industrial Plastics, Ltd.	*21	—	—	×	×	—	—	—	—	—	—	—	—	—	—	—
British Moulded Plastics, Ltd.	*6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×
British Resin Products, Ltd.	*9	—	×	×	—	—	×	—	—	—	—	—	—	—	—	—
Courtaulds, Ltd.	V.25	—	—	—	—	—	×	—	—	—	—	—	—	—	—	—
Dunlop Special Products, Ltd.	V.28	—	—	—	—	—	—	—	—	—	×	—	—	—	—	—
Erinoid, Ltd.	*13	×	—	—	×	—	×	—	×	×	—	—	—	—	—	—
Hornflowa, Ltd.	*19	—	—	×	—	—	—	—	—	—	—	—	—	—	—	—
Imperial Chemical Industries, Ltd.	*12	—	×	×	—	×	—	—	—	×	—	×	×	×	×	—
O. & M. Kleemann Ltd.	V.16	—	—	—	—	—	×	—	×	—	—	—	—	—	—	—
Rubber Improvements Ltd.	*4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	×
Vinatex Ltd.	V.9	—	—	—	—	—	—	—	—	×	—	—	—	—	—	—
OLYMPIA.																
Dohm Ltd.	C.25	—	—	—	—	—	×	—	×	×	—	—	×	—	—	—
Vinyl Products, Ltd.	C.45	—	—	—	—	—	—	—	×	×	×	×	—	—	—	—

* The number indicates a Showcase on Stand No. V.12/15, jointly occupied by Members of the British Plastics Federation ★



Plan of Plastics Section on the first floor of the Earls Court Exhibition Hall.

V.1. —Commercial Plastics Ltd.
V.2/11. —B.X. Plastics, Ltd.
V.3. —Imperial Chemical Industries, Ltd.
V.4. —Injection Moulders, Ltd.
V.5. —Wallington Weston and Co. Ltd.
V.6. —James North and Sons, Ltd.
V.7. —Creators, Ltd.
V.8. —The British Ebonite Co. Ltd.
V.9. —Vinatex, Ltd.
V.10. —C. and C. Marshall, Ltd.
V.12/15.—British Plastics Federation Combined Exhibit.★
V.13. —Radio Heaters, Ltd.
V.14. —Stone and Simmons.
V.14A. —The Leather Cloth Co. Ltd.
V.16. —O. and M. Kleemann, Ltd.
V.17. —Plysu Products, Ltd.
V.18. —Flexigrip, Ltd.
V.19. —Moulded Components (Jablo) Ltd.
V.20. —Plastic Engineers, Ltd.
V.21. —Duraplex (Plastics) Ltd.
V.22. —Storey Bros. and Co. Ltd.
V.23. —Thermo-Plastics, Ltd.
V.24.—Ministry of Supply Plastics Exhibit
V.25. —Courtaulds, Ltd.
V.26. —Play-fab, Ltd.
V.27. —Stanley Smith and Co.
V.28. —Dunlop Special Products, Ltd.
V.29. —Phoenix Rubber Co. Ltd.

industrial uses. A new rubber-filled moulding material, for instance, produced initially for the textile industry, gives articles made from it a degree of flexibility which improves their mechanical strength and anti-cracking properties. A second new moulding material has glass as its filler to provide an impact resistance some three or four times greater than usual, together with complete rigidity and exceptional resistance to water. A number of new laminates also incorporate glass in fabric form to provide similar qualities as well as very good anti-cracking properties in one grade and immunity from temperatures up to 250 degrees C. in another. This type of laminated is now being used for a number of important applications from Admiralty switch-gear to aircraft flooring. And in a completely different field from these is a new resin for producing foundry moulds and cores by a revolutionary "shell" method.

On the thermoplastics side are the "Vybak" vinyl compounds which are of particular value for extrusion and for injection moulding.

The British Ebonite Co., Ltd. (V.8)

"Becol" ebonite in sheet, rod and tube form to B.E.S.A. specification 234, and "Beconate" loaded ebonite made to Wireless Telegraphy Board specifications are the products of the company. The tubes which are made in lengths up to 10 ft, are suitable for the electrical, chemical and film industries. Flanges, bends, tees and sockets are made for the tubes.

British Geon, Ltd. ★

This member of the Distillers' Group manufactures vinyl resins, latices and compounds. The theme of the exhibit at Earls Court is "Geon at Work," in which these raw materials are shown with a selection of typical products involving their use.

The p.v.c. products illustrated include industrial protective clothing, coal mine conveyor belting, cable dielectric and sheathing, weatherproof (p.v.c. "oilskin") clothing, car upholstery, rail-car panelling, drum linings, rainwear, travel bags and beer hose.

A new vinyl resin "Geon 400X150" is intended for use in rigid moulding compounds for compression moulding of gramophone records and similar products. The good solubility range of the resin also makes it of great interest in the surface coating field.

British Industrial Plastics, Ltd. ★

Other activities of the B.I.P. group being represented in Birmingham, the display on the Federation stand features new ideas for moulding, with special emphasis on "Beetle" melamine moulding powder. The recently developed service offering facilities and advice on product and mould design will also be demonstrated.

British Moulded Plastics, Ltd. ★

The activities of these trade moulders are shown by mouldings such as the 32 lb. "Sobell" television console cabinet—the biggest compression moulding in production in this country, and a polystyrene food storage rack for the "Prestcold" refrigerator, one of the biggest injection mouldings made here. Nylon moulding, which requires a great deal of technical skill, is now being developed and some components in this material are on show.

British Resin Products, Ltd.★

Another subsidiary of the Distillers Group manufactures plastics moulding powders including "Cellomold" cellulose acetate, "Distrene" polystyrene and "Rockite" phenolic and urea. In the field of adhesives are the "Cellobond" phenolic and urea synthetic resin adhesives used in a variety of constructional work including boat building. To show the effectiveness of the adhesives for wood and veneer bonding, the company recently sponsored the manufacture for the first time, of corrugated plywood. This attractive structural material promises to have widespread uses.

British Xylonite Co., Ltd., Cascelloid Division ★

The value of plastics in packaging is seen by the many productions of the company. Polystyrene and cellulose acetate are used for special phials, boxes, etc., made by injection moulding. Polythene bottles, especially squeeze-bottles, are made in many designs by blow moulding. Fabricated cellulose acetate sheet boxes are produced on the large, automatic "Trans-Bo-Matic" machine. Polythene layflat tubing and bags, which are completely water-vapour proof, are supplied for export and Services packaging.

Commercial Plastics, Ltd. (V.1)

P.V.C. products of the company are "Fablon" thin film and sheeting for clothing, packaging, industrial and domestic uses, and "Superlon" leathercloth, supported and unsupported, which is used mainly for bag making, travel goods and upholstery.

E. K. Cole, Ltd., Plastics Division. ★

A recently acquired 48-oz. injection-moulding machine has put this company in the forefront of large-size thermoplastic moulders. An extrusion section and facilities for vacuum deposition of metal coatings are other innovations at the factory. Injection mouldings produced on the press comprise a large industrial lampshade in "Diakon" claimed to be the largest

Table 2.—Plastics materials supplied in the form of semi-manufactured products shown in the Plastics Section at Earls Court.

Exibitor	Stand No.	Laminated sheet, tube	Phenolic extrusions	Decorative laminates	Expanded plastics	Acrylic sheet, rod, tube	Polystyrene sheet, rod, film	Cellulose acetate sheet, film, tube	Nylon blanks for machining	P.v.c. rigid sheet, rod, tube	P.v.c. fabric-supported sheeting	P.v.c. unsupported film and sheeting	P.v.c. flooring	P.v.c. extrusions	Polythene layflat tubing	Foundry resins	Casting resins	Adhesives
B.X. Plastics Ltd.	V.2/11	—	—	—	X	X	X	X	—	X	—	X	—	X	X	—	—	X
Bakelite, Ltd.	*3	X	—	X	—	—	—	—	—	—	—	—	—	—	—	X	—	X
British Ebonite, Co., Ltd.	V.8	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
British Industrial Plastics, Ltd.	*21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	X	X
British Resin Products, Ltd.	*9	—	X	—	—	—	—	—	—	—	—	—	—	—	—	X	—	X
Cascelloid, Ltd.	*23	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—
Commercial Plastics, Ltd.	V.1	—	—	—	—	—	—	—	—	X	X	X	—	X	—	—	—	—
Courtaulds, Ltd.	V.25	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Creators, Ltd.	V.7	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—	—
De La Rue, Thos, and Co., Ltd.	*18	X	—	X	—	—	—	X	—	X	—	—	X	X	X	—	—	—
Dunlop Special Products, Ltd.	V.28	—	—	—	—	—	—	—	—	X	X	X	X	—	—	—	—	X
Duraplex (Plastics) Ltd.	V.21	—	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—	—
Ebonestos Industries, Ltd.	*11	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Erinoid, Ltd.	*13	—	—	—	—	—	X	X	—	X	—	—	—	X	—	—	—	—
Greenwich Leathercloth Co., Ltd.	*24	—	—	—	—	—	—	—	—	—	X	X	—	X	—	—	—	—
Hornflowa, Ltd.	*19	—	—	X	—	—	—	—	—	—	—	—	X	—	—	X	—	X
Imperial Chemical Industries, Ltd.	V.3 *12	—	—	—	—	X	—	—	X	—	—	—	—	—	X	—	X	X
Kenverne, Ltd.	*22	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Leather Cloth, Co., Ltd.	V.14a	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Marshall, C. and C., Ltd.	V.10	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Moulded Components (Jablo) Ltd.	V.19	X	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—
North, James, and Sons, Ltd.	V.6	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—
Phœnix Rubber Co., Ltd.	V.29	—	—	—	—	—	—	—	—	X	—	—	X	X	—	—	—	X
Plastic Engineers, Ltd.	V.20	—	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—
Rubber Improvement, Ltd.	*4	—	—	—	—	—	—	—	—	X	—	X	—	X	—	—	—	—
Smith, Stanley, and Co.	V.27	—	—	—	—	—	—	—	—	X	X	X	—	X	—	—	—	X
Storey Bros. and Co., Ltd.	V.22	—	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—	—
Tenaplas, Ltd.	*5	—	—	—	—	—	—	—	—	—	—	X	—	X	—	—	—	X
Tufnol, Ltd.	*7	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Utilex, Ltd.	*10	—	—	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—
Vinatex, Ltd.	V.9	—	—	—	—	—	—	—	—	—	X	X	—	—	—	—	—	—
Wallington Weston and Co., Ltd.	V.5	—	—	X	—	—	—	—	—	X	X	X	X	—	—	—	—	—

* The number indicates a showcase on the British Plastics Federation Stand V.12/15. ★

produced in this country by conventional injection moulding, an ice cream body lid, and a refrigerator evaporator door. With these will be the "Ekco Belvedere" toilet seat and cover, each moulded in one piece, the "Ekco-Unimer" polystyrene cistern float, two-colour adding machine key tips, vacuum deposited metal coatings on moulded trade mark symbols, and plastic lattice grilles. Sanitary fittings displayed include the new low-priced "Jubilee" moulded toilet seat available in a range of eleven permanent colours.

Courtaulds, Ltd. (V.25)

The light pastel colour range of cellulose acetate moulding powders are given prominence, mouldings and extrusions made using the materials being displayed. An acetate moulding powder with an acetyl value of 58 has been developed and has been added to the standard range. Its exceptionally good dimensional stability, especially under humid conditions should enlarge the uses of cellulose acetate materials. Various gauges of Courtaulds transparent cellulose acetate film are also shown.

Creators, Ltd. (V.7)

Most of the products of the company are concerned with the use of p.v.c. by dipping, moulding, extruding, welding, etc. A new method of covering rigid steel wire and automatically cutting to predetermined lengths is the basis for the fabrication of coathangers and similar articles. "Watermaster" garden hose and "Flexigas" coloured gas piping are exhibited for the first time, as is also the "Broadway" gramophone record magazine. This has space for 50 records, which rest individually between plastics-covered rods on plastics cushions. For storage the rack tips through 90 degrees and folds away.

Crystalate, Ltd., Ebonestos Industries, Ltd., and Mica Products, Ltd. ★

All three companies in this group are trade moulders and use a wide range of thermosetting and thermoplastic materials to produce industrial mouldings, cosmetics packages, toys, etc. Phenolic laminated tubes are also produced.

Thomas de la Rue and Co., Ltd., Plastics Division ★

Plastics products of the division fall into three groups. Laminates are for electrical and engineering use, or decorative surfaced types for building, furniture and shop fitting. Extrusions in rigid and flexible materials are produced to order for individual jobs. Floor tiles made from p.v.c. are standard products of the company.

Dunlop Special Products, Ltd. (V.23)

A special feature is made of the emulsion polymerization of polyvinyl acetate for use in paints, adhesives and in thermoplastic flooring compositions. Vinyl sheeting is produced in rigid and flexible forms including fabric-supported types. "Duvina" thin p.v.c. film, printed by a new multi-colour process, is shown for the first time.

Duraplex (Plastics), Ltd. (V.21)

To the range of flexible p.v.c. materials previously shown by this company, a new range of "textile" designs has been added for use by the furnishing trade.

Erinoid, Ltd. ★

Standard materials manufactured are casein in the form of button and knitting pin rods, pen and pencil tubes, sheets, etc.; cellulose acetate and polystyrene moulding powders; sheets of the same materials, including acetate optical sheet; p.v.c. moulding powder and extruded sheet. New high impact polystyrene moulding powders and special extrusions for industry and the Services are shown for the first time.

Flexigrip, Ltd. (V.18)

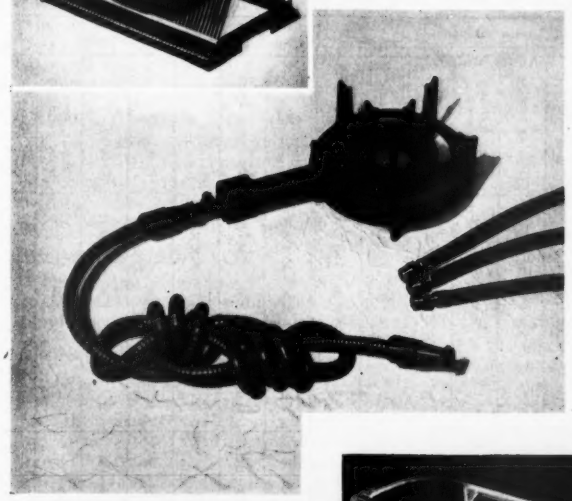
The "Flexigrip" extruded plastics slide fastener shown at the plastics section of the B.I.F. last year is shown again with some of the bags and garments now using this method of closure. The air-tight seal produced also makes the fastener suitable for packaging purposes.

Greenwich Leathercloth Co., Ltd. ★

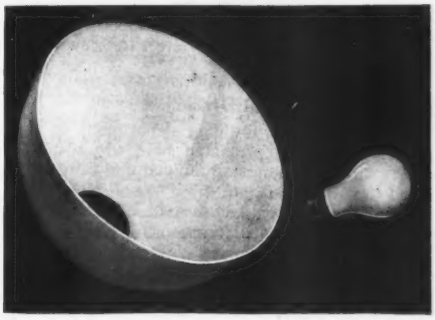
A number of metallic finishes will be shown for "Duranide" p.v.c. leathercloth

SOME NEW EXHIBITS AT EARLS COURT

(Below) Two products of the p.v.c.-coating process by Creators, Ltd. are the "Broadway" record storage magazine and "Flexigas" coloured gas tubing.

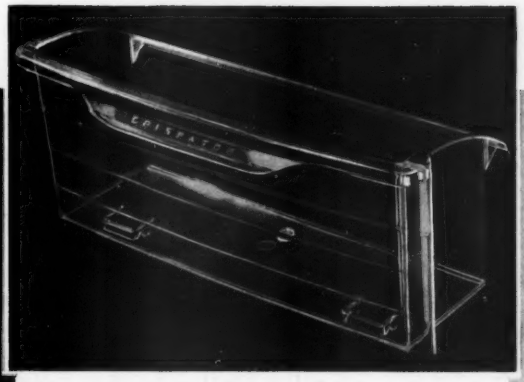


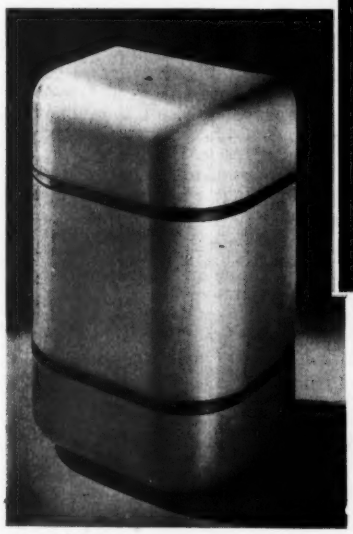
(Left) Weather protective coat, sou'wester and leggings made from fabric-supported p.v.c. have been added to the range of industrial workers' garments manufactured by James North and Sons, Ltd.



(Above) The electric-light bulb indicates the large size of this injection-moulded "Diakon" lampshade made by E. K. Cole, Ltd.

(Above) A new range of p.v.c. table covers is introduced by Storeys of Lancaster under the name "Princess" covers.





Three recent trade mouldings of the National Plastics Group to be exhibited in London and Birmingham are the polystyrene food storage rack for "Prestcold" refrigerator (above) moulded by British Moulded Plastics, Ltd., the phenolic cover for Berry's water heater (left) and the phenolic motor housing and pistol grip for "Ega" spray-gun (right) produced by Moulded Products, Ltd.

and makes an interesting addition to the range of p.v.c. sheeting, film and supported leathercloth Considerable research was required to achieve a permanent finish which could be matched against the range of metallic cellulose finishes employed by a leading car manufacturer who uses the new material. In the packaging field electrically heat-sealed p.v.c envelopes are also newly introduced.

Halex, Ltd., Industrial Division. ✱

Only the trade moulding department of the company is represented here to show some of the components moulded and fabricated for different industries. Almost all conventional moulding materials are employed. Of particular interest is a set of refrigerator components, a cigarette-making tray and some display packs

Hornflowa, Ltd. ✱

Urea-formaldehyde resins, the basis for the horn-filled buttons for which this company is known, are now also used by them in the production of foundry core-binding resins and for adhesives. For building work p.v.c. floor tiles, introduced last year, are now joined by another product—wall panels with a melamine finish. Finally, Hornflowa produce injection mouldings from polystyrene and cellulose acetate.

Imperial Chemical Industries, Ltd., Plastics Division (V.3 and ✱)

The Plastics Division's products, which in addition to those materials indicated in Tables 1 and 2 include plastics monofilament, are shown on the Federation stand. The stand separately occupied by this company is designed as a reception office for overseas visitors. I.C.I. plastics materials are used extensively in the construction and decoration of this stand.

Injection Moulders, Ltd. (V.4)

As the name implies, this company specializes in the production of injection mouldings for a wide range of industries using all the materials normally suitable for the process. New exhibits on the stand will be a range of toys, and various technical components for aircraft, radio and accumulators.

Insulators, Ltd. ✱

A selection of trade mouldings in thermosetting and thermoplastic materials are shown. A new set of mouldings forms part of accounting and office machinery.

Kent Mouldings ✱

Many of the mouldings produced by this firm are for the telephone system of the G.P.O. Two other new productions are masks for 14-in. rectangular television tubes, compression moulded in a phenolic shock-resisting material, and pin protectors for commercial use for 7- and 9-pin miniature valves, injection moulded in polythene. The patented design of these pin protectors enables them to be used on both types.

Kingsland Steam Joinery Works, Ltd. ✱

The sole plastics products manufactured by the company are compression-moulded lavatory seats.

Kenverne, Ltd. ✱

Plain and roller printed p.v.c. sheet manufactured by this company is also made up into aprons, rainwear and babywear, tablecovers and similar articles.

Table 3.—Moulders and Fabricators in the Plastics Section at Earls Court.

Exhibitor	Stand No.	Processes performed												Main fields of application						
		Compression moulding	Transfer moulding	Injection moulding	Laminating	Extruding	Calendering	Film casting	Dipping/coating	Sheet forming and blowing	Machining	Welding	Printing/marking	Industrial components	Domestic ware	Building furniture	Packaging	Display	Games, toys, fancy goods	Clothing, bags, etc.
B.X. Plastics Ltd.	V.2/11	—	—	—	X	X	X	X	—	X	—	—	—	X	X	X	X	X	—	X
Bakelite, Ltd.	*3	—	—	—	X	—	X	—	—	—	X	—	—	X	—	X	—	X	—	—
British Moulded Plastics, Ltd.	*6	X	X	—	—	X	—	—	—	—	—	—	—	X	X	X	—	—	—	—
British Resin Products, Ltd.	*9	—	—	—	—	X	—	—	—	—	—	—	—	X	—	X	—	—	—	—
Cascelloid, Ltd.	*23	—	—	X	—	X	—	—	—	—	X	—	X	X	X	—	X	X	X	X
Co'e. E. K., Ltd.	*27	X	X	X	—	X	—	—	—	—	—	—	X	X	X	X	X	—	X	—
Creators, Ltd.	V.7	—	—	X	—	X	—	—	X	—	X	X	X	X	X	—	—	—	X	X
Crystalate, Ltd.	*11	X	X	X	X	—	—	—	—	—	X	—	—	X	X	—	X	—	X	—
De La Rue, Thos. and Co., Ltd.	*18	—	—	—	X	X	X	—	—	—	—	—	—	X	—	X	X	X	—	—
Ebonestos Industries, Ltd.	*11	X	X	X	X	—	—	—	—	—	X	—	—	X	X	—	—	—	X	—
Erinoid, Ltd.	*13	—	—	—	—	X	X	—	—	—	—	—	—	X	—	—	X	—	—	X
Flexigrip, Ltd.	V.18	—	—	—	—	X	—	—	—	—	—	—	—	—	—	—	X	—	—	X
Halex, Ltd.	*15	X	X	X	X	X	—	—	—	X	X	—	—	X	X	—	X	X	—	—
Injection Moulders, Ltd.	V.4	—	—	X	—	—	—	—	—	—	—	—	—	X	X	—	X	X	X	—
Insulators, Ltd.	*8	X	X	X	—	—	—	—	—	—	—	—	—	X	X	X	—	—	X	—
Kent Mouldings	*25	X	X	X	—	—	—	—	—	—	—	—	—	X	—	—	—	—	—	—
Kenverne, Ltd.	*22	—	—	—	—	—	X	—	—	—	—	—	—	—	X	—	—	—	—	X
Kingsland Steam Joinery Works, Ltd.	*26	X	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—	—	—	—
Kleemann, O. and M., Ltd.	V.16	—	—	X	—	—	—	—	—	—	—	—	—	—	—	—	—	—	X	—
Lacrinoid Products, Ltd.	*14	X	X	X	—	X	—	—	—	X	X	—	X	X	—	X	—	—	—	X
London Moulders (Plastics), Ltd.	*2	X	X	X	—	—	—	—	—	—	—	—	—	X	X	—	X	—	X	—
Marshall, C. and C., Ltd.	V.10	—	—	—	—	X	—	—	—	—	—	—	X	X	—	X	—	—	—	X
Mica Products, Ltd.	*11	X	X	X	X	—	—	—	—	—	X	—	—	X	X	—	X	—	X	—
North, James, and Sons, Ltd.	V.6	—	—	—	—	—	—	—	X	—	—	X	X	X	—	—	—	—	—	X
Phoenix Rubber Co., Ltd.	V.29	X	—	—	X	X	X	—	—	—	—	—	—	X	—	X	—	—	—	—
Plastic Engineers, Ltd.	V.20	—	—	X	—	—	—	—	—	—	—	—	—	X	—	—	X	—	X	—
Play-Fab, Ltd.	V.26	—	—	X	—	—	—	—	—	—	—	—	—	—	X	—	—	—	X	—
Plysu Products, Ltd.	V.17	—	—	—	—	—	—	—	X	—	—	X	—	X	—	—	—	—	—	X
Rubber Improvement, Ltd.	*4	X	—	—	X	X	X	—	—	X	—	—	—	X	—	X	X	—	—	X
Shipton, E., and Co., Ltd.	*17	X	X	X	—	—	—	—	—	X	—	—	—	X	—	—	X	—	—	—
Stanley Smith and Co., Ltd.	V.27	—	—	—	—	X	X	—	—	—	—	—	—	X	—	—	X	X	—	X
Stone and Simmons	V.14	—	—	X	—	—	—	—	—	—	—	—	—	—	X	X	X	—	—	—
Storey Bros. and Co., Ltd	V.22	—	—	—	—	—	X	—	—	—	—	—	—	—	X	—	—	—	X	X
Tenaplas, Ltd.	*5	—	—	—	—	X	—	—	—	—	—	X	X	X	—	X	—	—	—	X
Thermo-Plastics, Ltd.	V.23	X	X	X	X	—	—	—	—	X	X	X	X	X	X	—	—	X	—	—
Tufnol, Ltd.	*7	—	—	—	X	—	—	—	—	—	X	—	—	X	—	—	—	—	—	—
Universal Metal Products, Ltd.	*16	X	X	X	—	—	—	—	—	—	X	—	X	X	X	—	X	—	X	—
Universal Plastics, Ltd.	*1	X	—	X	—	—	—	—	—	—	—	—	—	—	X	—	—	—	X	—
Utilex, Ltd.	*10	—	—	—	—	—	—	X	—	X	—	—	X	—	X	—	X	X	—	—
Vinatex, Ltd.	V.9	—	—	—	—	—	—	—	X	—	—	—	X	X	—	X	—	—	—	X
Wallington Weston and Co., Ltd.	V.5	X	—	X	X	X	X	—	—	—	X	—	—	X	—	X	—	—	X	—

* This number indicates a showcase on the British Plastics Federation Stand V.12/15.★

O. and M. Kleemann, Ltd. (V.16)

In addition to cellulose acetate moulding powders "Kleestron" polystrene moulding powders are now produced. The moulded products which will also be shown in the toy section at Olympia are toys and household articles. A new range of toys faithfully reproduces a series of military vehicles in miniature.

Lacrinoid Products, Ltd. ✱

Standard products are buttons, and builders' hardware such as door handles, drawer pulls and hooks. Custom mouldings are produced in a range of materials, including a special graphite-loaded phenolic type used for self-lubricating bearings. Screwdriver handles extruded from "Tenite II" cellulose acetate butyrate are displayed.

The Leather Cloth Co., Ltd. (V.14a)

A newcomer to the plastics section of the Fair, the company makes a range of leathercloths using oil, cellulose or p.v.c. material, for upholstery, travel goods and baby carriages.

London Moulders (Plastics), Ltd. ✱

Products exhibited are divided into custom mouldings and those for direct sale. The company's own selling lines are mainly toys, fancy goods and household articles. A boxed nursery feeding set has been added to this group.

C. and C. Marshall, Ltd. (V.10)

P.V.C. extrusions are required in increasing variety for all branches of industry. Motor cars, furniture, bags, shoes, all have essential uses for this form of plastics, in which Marshall specialize.

Ministry of Supply (V.24)

The plastics wing about which details were released last year has been chosen as a non-commercial exhibit for the Plastics Section.

Moulded Components (Jablo), Ltd. (V.19)

"Jabroc" high-density wood veneer laminates are used for structural purposes, for the production of press tools and rubber-press tools used in aircraft construction. "Aero-Jablex" expanded plastics material is used principally as a thermal insulation material, for example in the walls of low-temperature food-carrying containers.

James North and Sons, Ltd. (V.6)

Starting with the manufacture of industrial gloves protected by a strong dip-coating of p.v.c., North have now developed a complete range of protective clothing, using their own fabric-supported material. Some new products will be seen on the stand: foul-weather garments for municipal and industrial outdoor workers, motorcycle garments in a recently developed new material, and a heat-resisting glove.

Phœnix Rubber Co., Ltd. (V.29)

"Phenco" plastics flooring, which is supplied in tiles or rolls, has three special grades apart from the standard type. These are (a) conductive flooring for operating theatres, (b) acid resistant flooring for laboratories, and (c) heat resistant flooring for the tropics.

An additional type of road marking unit is a 24-in. wide serrated Zebra crossing marker. A new type of p.v.c. sheet has been developed for wrapping cables and for lapping inserts in sheathed cables. Other products are plastics and rubber compounds, extrusions, adhesives and vinyl compounds for gramophone record manufacture.

Plastic Engineers, Ltd. (V.20)

These injection moulders have made nylon their speciality and produce mouldings, as well as blanks for machining, in this material. Some new "Nymol" components are shown. Other mouldings include polystyrene containers for cosmetics and pharmaceuticals, and fancy goods moulded in cellulose acetate.

Play-Fab, Ltd. (V.26)

This newcomer to the Fair exhibits toys, novelties, smallwares and other types of injection mouldings. A product design service and tool-room facilities are offered to customers.

Plysu Products, Ltd. (V.17)

Specialists in high-frequency welding of plastics, the main products of the company are suits of protective clothing for chemical, agricultural and other industrial workers. Welding and dipping processes are also used in the manufacture of aircraft components. A new item is the "Supermaid" mop, a cellulose sponge mop with polystyrene head having a unique wringing action.

Radio Heaters, Ltd. (V.13)

The "Radyne" high frequency welding and pre-heating machines are briefly described and illustrated on p.133.

Rubber Improvements, Ltd. ✱

Non-inflammable conveyor and transmission belting of p.v.c. for use in coal mines is produced by this company. Other p.v.c. products include rigid and flexible sheeting, flooring, and a low-temperature-resistant film and sheet.

Stanley Smith and Co. (V.27)

P.V.C. sheeting made by the company ranges from a rigid type to packaging film. Press-polished sheet is a special form. Extrusions are produced in polythene and p.v.c. Another group of products consists of synthetic resin adhesives.

Stone and Simmons (V.14)

Injection mouldings in polystyrene and cellulose acetate for domestic ware, catering, and cosmetics packaging. The wall tiles made by this company are in production, together with new products including graduated measure jugs with metric or English markings, a soap saver, a tray with six liqueur tots, and an egg separator.

E. Shipton and Co., Ltd. ✱

Specialist moulders in polythene, these manufacturers produce the "Poly-Tainer" range of polythene bottles and jars ranging in size from 2-oz. to 1-gallon capacity. Various designs are now in production for use in industry and for cosmetics. In the latter field decorations such as beading or fluting can be incorporated in the surface of the container. The sole distributors are Industrial Appliances, Ltd.

Storeys of Lancaster (Storey Bros. and Co., Ltd.). (V.22)

Plastics sheeting and leathercloth, both nitrocellulose and p.v.c. types, are manufactured by Storeys for use in table covers, curtains, clothing, travel goods, perambulators and many other products. A new translucent printed table cover, the "Princess" cover, will be shown for the first time. There are two sizes, 45 ins. by 45 ins. and 45 ins. by 54 ins., both of which are free from purchase tax since the Budget.

Tenaplas, Ltd. ✱

The principal activity of the company is extrusion of p.v.c. and polythene. The first is extruded in many rigid or flexible sections for use in engineering, motorcar construction and chemical industries. Polythene is produced mainly in the form of tubing for chemical work, water supplies, food processing, etc., and in electrical applications. Two new products being exhibited are multi-colour wires and plumbing tubing.

Thermo-Plastics, Ltd. (V.23)

The stand features especially the contribution of this company to the aircraft industry and shows several new examples of mouldings from acrylic sheet and laminated glass fibres. Television escutcheons and advertising displays in a variety of materials are also shown. The range of "Perspex" catering equipment and fittings has been increased.

Tufnol, Ltd. ✱

A selection of gear wheels, bearings and other engineering components produced from "Tufnol" phenolic laminates is shown to indicate the properties and uses of the material.

Universal Metal Products, Ltd., Plastics Division ✱

These moulders manufacture domestic ware and bathroom equipment as their own lines. As trade moulders they produce components for the textile industry, for engineering, packaging, toys and many other trades.

Universal Plastics, Ltd. ✱

Tableware, household goods, toys and fancy goods are the main line of mouldings produced. A trade moulding service is also available to make moulded components to customers' requirements.

Utilex, Ltd. ✱

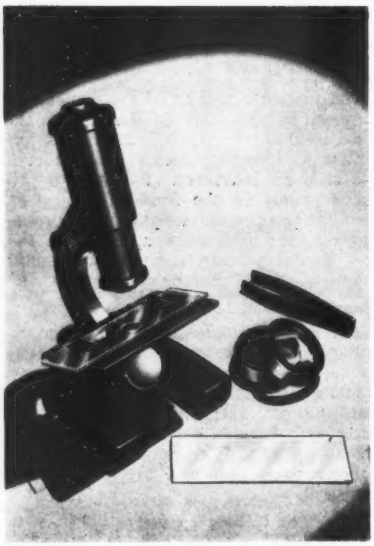
Cellulose acetate sheet and film is supplied in a variety of colours and gauges, whilst a subsidiary, Kingcraft, Ltd., specializes in the fabrication of transparent and other boxes. Tracing film and a special grade film with frosted finish for visible index systems are seen for the first time at the Fair.

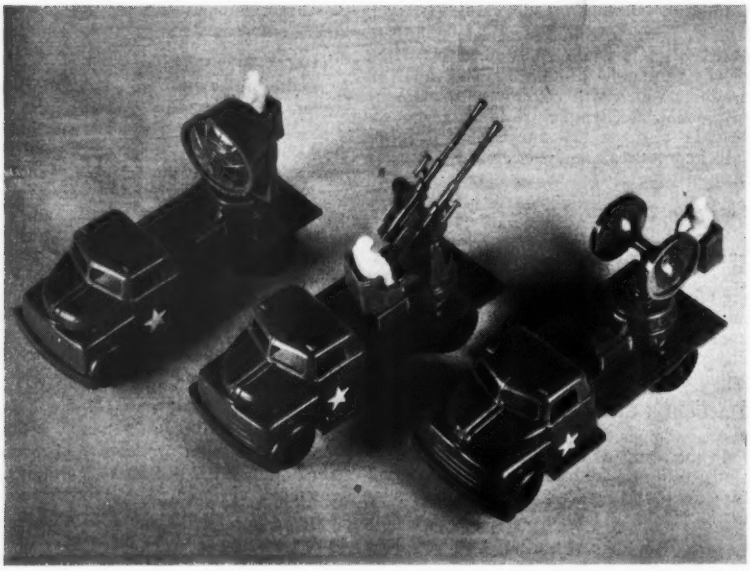
Vinatex, Ltd. (V.9)

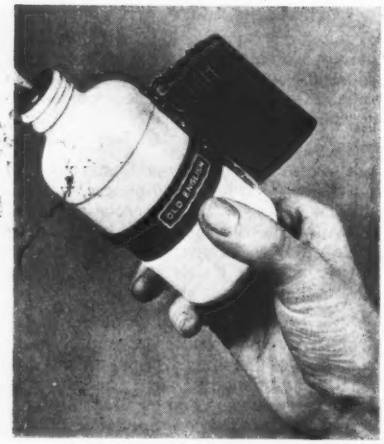
This company is concerned entirely with p.v.c. in its various forms. Activities include compounding, paste making and spreading, embossing and printing. As sole distributors for Dunlop Special Products, Ltd., the company sells fabric-backed and unsupported p.v.c. sheet and film. "Chromastyle" multi-colour prints are new to the Fair. Vinatex also claim to be first in the world to roller-print glass cloth.

Wallington, Weston and Co., Ltd. (V.5)

P.V.C. compounds and products include rigid and flexible sheet, cloth-backed sheet, and film. "Muraplas" wall tiles for amateur fixing are another production. "Fromoplas" H.T. is a thermoplastic copolymer which is supplied in chip form, mouldings and sheets, etc. It is half the weight of commercial aluminium and about one-seventh the weight of chrome steel. It has a tensile strength of 12,000 to 14,000 lb./sq. in. and it has the very high impact strength of 7 (izod). In one case with an extruded tube, ¼-in. bore and ¼-in. wall, a figure of 14 ft.-lb. was obtained.







B.I.F.—OTHER LONDON EXHIBITS

OUTSIDE the Plastics Section, in other parts of the Fair devoted to brushware, toys, fancy goods, chemists' supplies, sales services, etc., the influence of plastics materials is also growing. On this page we show a small selection of such products as seen at Olympia and Earls Court.

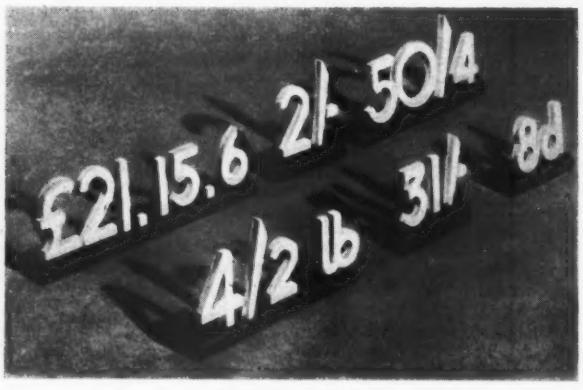
(Above, right) Part of the series of military toy vehicles moulded in polystyrene by O. and M. Kleemann, Ltd. (Olympia, O.87.)

(Above, left) This all-plastics microscope by Selcol Products, Ltd. (Olympia, O.100), is a working replica of a real laboratory instrument (magnification × 45).

(Left) The upper illustration shows a novel illuminated window display panel manufactured by Zell-Em, Ltd. The lettering and the other silhouettes are produced by sticking self-adhesive cut-outs made of press-polished p.v.c. on to a glass surface which is illuminated from behind. (Earls Court, S.13). The lower illustration shows a polythene squeeze bottle used by New Hygiene, Ltd., for their disinfectants and insecticides. (Olympia, D.18)

(Below, left) The all-plastics "Kennet" interchangeable price markers consist of injection-moulded letters which slide into an extruded base section. (Earls Court.)

(Below, right) The "Genik" hair brush manufactured by Hindes, Ltd., with a plastics back, nylon filled, has part of the base detachable to facilitate cleaning. (Olympia, E.7.)



B.I.F.—Plastics Machinery in London

Machinery for the plastics industry is exhibited in the Engineering Section of the Fair at Castle Bromwich. In London, however, there are a few machines and accessories at Earls Court and Olympia.

Baldwin Instrument Co., Ltd. (Olympia B.20)

"Atomat" beta-ray thickness or weight gauge is an instrument measuring weight per unit area of sheet materials such as paper, cardboard, plastic, rubber and metal foil by the absorption of beta radiation. Sensitivity to lightweight materials has been improved and the range extended to heavier materials by the use of newly available materials.

Beta-ray backscatter thickness gauge. This instrument measures weight per unit area of material having an appreciably different atomic number to its backing. The model shown is for gauging tin on steel. Similar equipment can measure plastic film on metal rollers.

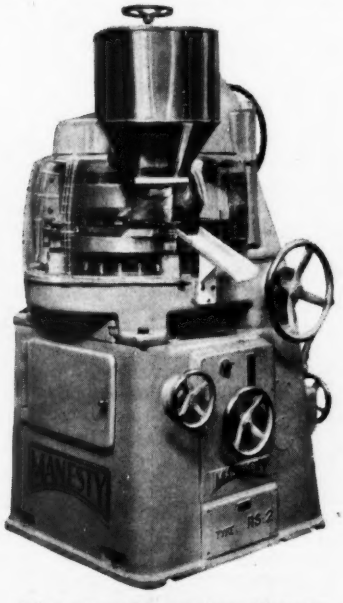
"Baldwin-Dunlop" Statigun. Static charges on the surface of materials such as paper, plastics, rubber, etc., produced during manufacture may be measured directly with this instrument. A probe unit in the head is directed at the charged surface. In the head is a miniature electrometer valve and a suitable circuit followed by an indicating micrometer. This is directly calibrated from 0-2 kV/ft. An extendable sleeve with multiplying factors of 10 and 100 is used for higher voltages. New attachments will also measure surface insulation resistance from 10^7 to 10^{13} ohms and charge density from 1×10^{-9} to 3×10^{-8} coulomb/cm^2.

Beasley, French and Co., Ltd. (Olympia G.26)

Here are to be seen a new four-colour aniline printer and a "Twin" bag-making machine.

Manesty Machines, Ltd. (Olympia D.35)

Moulding powder tablet making machinery is exhibited by this company. The R.S.2 rotary tablet machine is fitted with 21 pairs of punches and 21 dies, and tablets of up to $1\frac{3}{8}$-in. maximum diameter can be produced at the rate of 160 to 325 per minute. The maximum die filling depth of 2 ins. allows large and heavy tablets to be made. This machine has a variable speed drive, clutch control, worm drive in oil bath, and overload release, and is fully guarded. Punches and dies are interchangeable. A clutch allows the 5 h.p. motor to run at full speed under minimum load before engagement of the turret takes place.



R.S.2 rotary tablet machine (Manesty Machines, Ltd.)

Markmaster, Ltd. (Olympia F.26b)

This exhibit includes a display of work done by users of the Markmaster multi-purpose dry-foil reproduction equipment, including dial-plates, scales, and gauges for scientific instruments and clock faces.

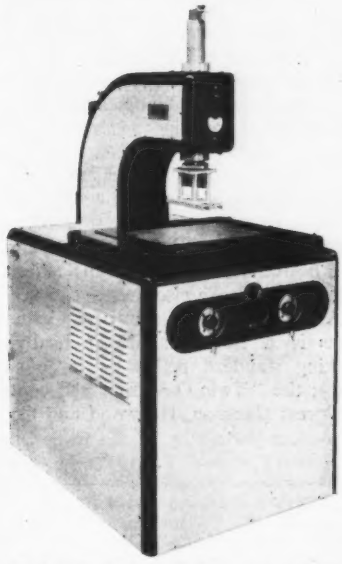
Amongst accessories displayed, an important item is a completely elastic foil-pigment, which can be applied to a flexible material, will stretch when the material is stretched, and retract when the material retracts, without cracking or coming away.

"Alpha" multi-colour foil printing machine (Markmaster, Ltd.)

Radio Heaters, Ltd. (Earls Court V.13)

This firm is displaying its various "Radyne" plastic sheet welding equipments, together with representative models from its range of plastics pre-heating units. An operator is producing p.v.c. notecases and other articles, using one of the smaller sizes of welding equipment. A display of articles which can be produced on the equipment is available for examination.

The new "Radyne" PW25 plastics press welder is displayed for the first time. This equipment has an output of over 3 kW, can be fitted with welding platens up to 18 ins. square and will undertake a profile weld of up to 12 ft. in length on suitable welding quality material. The press itself is operated from compressed air and includes two-step R.F. power switching, together with other very advanced features.



"Radyne" PW25 plastics press welder. (Radio Heaters, Ltd.)

Rejafix, Ltd. (Olympia F.39)

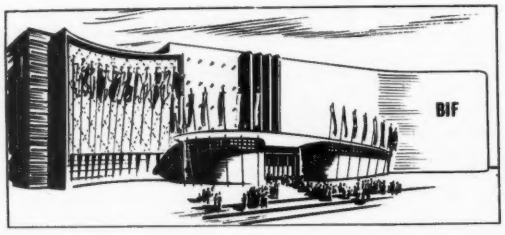
A comprehensive range of machines for printing, marking or decorating plastics articles of all shapes and description is shown by this company. There is a special display of marked production samples.

Summary of Plastics Machinery and Accessories at Earls Court and Olympia, London.

Exhibitor	Stand No.*	Cellulose Bag-Making Machinery	Thermoplastic Welding Machines	Preforming Machines	Moulds	Equipment for Printing on plastics
Beasley, French and Co. Ltd.	G.26	X	—	—	—	—
Crystalate Ltd.	V.12/15	—	—	—	X	—
Ebonestos Industries Ltd.	V.12/15	—	—	—	X	—
Manesty Machines Ltd.	D.35	—	—	X	—	—
Markmaster Ltd.	F.26b	—	—	—	—	X
Mica Products Ltd.	V.12/15	—	—	—	X	—
Radio Heaters Ltd.	V.13	—	X	—	—	—
Rejafix Ltd.	F.39	—	—	—	—	X
Screen Printing Machinery Ltd.	G.21	—	—	—	—	X
Soag Machinery Co.	G.41	X	—	—	—	—

* Section V at Earls Court; Sections D, F, G, and K at Olympia.

Plastics Machinery and Materials at Birmingham B.I.F.



Castle Bromwich, May 5 to 16

PLASTICS machinery is exhibited at the Birmingham (Castle Bromwich) Section of the Fair, where a number of machines are in operation to demonstrate the techniques of compression moulding, injection moulding and extrusion. The range of machinery shown this year is a comprehensive one, and although we miss several names which are well known as makers of plastics machinery, there are other names welcomed to this section of the Fair for the first time. A few exhibits of machinery and related equipment—for the preforming, high-frequency welding, and marking of plastics—will be found at the London Sections of the Fair, to which reference is made elsewhere.

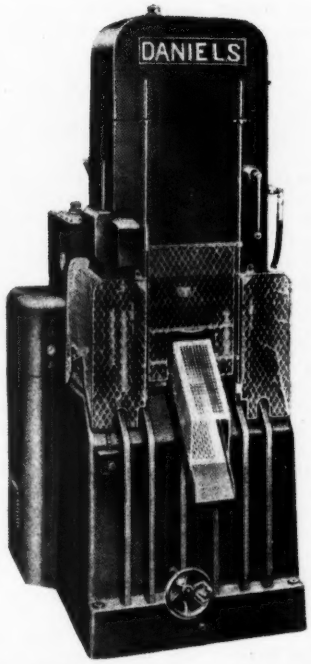
Among machinery shown at Castle Bromwich for the first time is a horizontal hydraulically-operated machine for making standard pellets of large size (B.I.P. Engineering, Ltd.); the "Twin-O-Matic" self-contained hydraulic moulding press (Jackson, Heywood and Co., Ltd.); a new addition (1 oz.) to the Windsor range of injection-moulding machinery (R. H. Windsor, Ltd.); and a ¾-oz. semi-automatic injection machine (Davidsons Engineers (M/C), Ltd.).

Other exhibits at Castle Bromwich comprise mouldings, laminates, extrusions, etc., finding applications in electrical engineering, general engineering and the building trade. Highlights among these exhibits are conveniently summarized in the pages following. As in the Plastics Section of the Fair at Earls Court, London, a number of member-firms of the British Plastics Federation will also be found at Castle Bromwich jointly occupying one stand (C.618), where each of them have their own showcase.

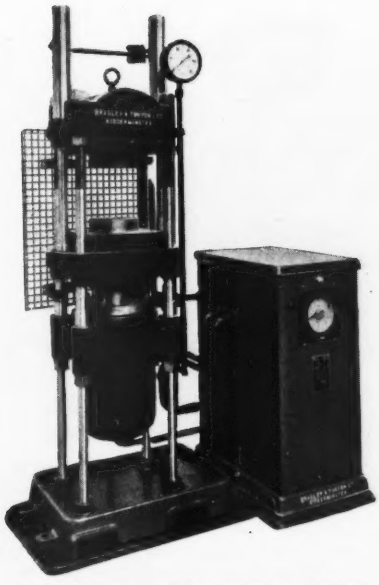
The Gauge and Tool Makers' Association also have a composite stand (C.319) for the exhibits of their member-firms, whose products find use in the toolrooms of moulders and fabricators. Brief notes on these particular exhibits are given on page 140.

Summary of Plastics Machinery and Accessories at Castle Bromwich, Birmingham.

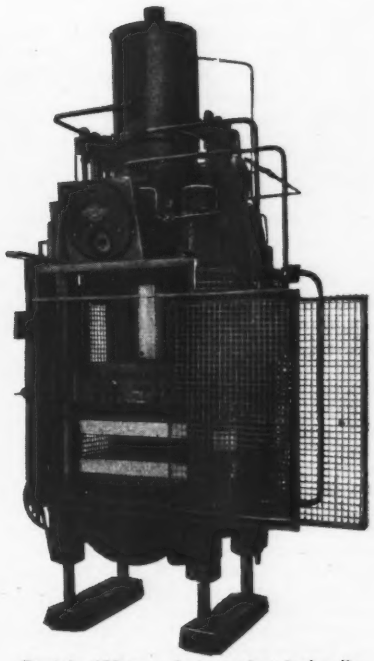
Exhibitor	Stand No.	Moulding Presses (including transfer moulding)	Hydraulic Pumps and accumulators	Injection moulding machines	Extrusion machines	Preforming machines	Hobbing presses	Moulds	Die-sinking machines	Steel for moulds	Pulverizing machinery	Granulating and blending machinery	Timing and temperature control	Tool-room equipment
Allen, Edgar and Co., Ltd.	D.536	—	—	—	—	—	—	—	—	X	—	—	—	—
Arnott and Harrison, Ltd.	C.319	—	—	—	—	—	—	X	—	—	—	—	—	X
B.I.P. Engineering, Ltd.	D.322	X	—	—	—	X	—	—	—	—	—	—	X	—
B.I.P. Tools, Ltd.	C.319	—	—	—	—	—	—	X	—	—	—	—	—	—
Bradley and Turton, Ltd.	D.237	X	X	—	—	—	X	X	—	—	—	—	X	—
British Jeffrey-Diamond, Ltd.	D.528	—	—	—	—	—	—	—	—	—	X	—	—	—
Carr, Rich'd. W., and Co., Ltd.	D.234	—	—	—	—	—	—	—	—	X	—	—	—	—
Christy and Norris, Ltd.	D.403	—	—	—	—	—	—	—	—	—	X	—	—	—
Daniels, T. H. and J., Ltd.	D.310	X	—	—	—	X	X	X	—	—	—	—	X	—
Davidsons Engineers (M/C) Ltd.	C.206	—	—	X	—	—	—	—	—	—	—	—	—	—
Desoutter Bros., Ltd.	C.415	—	—	—	—	—	—	—	—	—	—	—	—	X
E.M.B. Co., Ltd.	D.240	—	—	X	—	—	—	—	—	—	—	—	—	—
English Steel Corporation, Ltd.	D.541	—	—	—	—	—	—	—	—	X	—	—	—	—
Ether, Ltd.	C.700	—	—	—	—	—	—	—	—	—	—	—	X	—
Fescol, Ltd.	D.652	Corrosion resisting treatment and renewal of worn hydraulic rams.												
Finney Presses, Ltd.	D.241	X	X	—	—	—	X	X	—	—	—	—	—	—
Foster, Yates and Thom, Ltd.	D.504	X	—	—	—	—	—	—	—	—	—	X	—	—
Fox and Offord, Ltd.	C.319	—	—	—	—	—	—	X	—	—	—	—	—	—
Gauge and Tool Makers Association	C.319	—	—	—	—	—	—	X	—	—	—	—	—	X
Herbert, Alfred, and Co., Ltd.	D.310	X	—	X	—	X	X	X	X	—	—	—	X	—
Hopkins, E. C., Ltd.	D.741	—	—	—	—	—	—	—	—	—	—	—	—	X
Jackson, Heywood and Co., Ltd.	C.612	X	—	—	—	—	—	—	—	—	—	—	—	—
Londex, Ltd.	C.722	—	—	—	—	—	—	—	—	—	—	—	X	—
Mills, John (Llanidloes), Ltd.	D.337	X	X	—	—	—	—	—	—	—	—	—	—	—
Neill, James, and Co. (Sheffield), Ltd.	D.502	—	—	—	—	—	—	—	—	X	—	—	—	—
P.A.M. Ltd.	C.505	—	—	—	—	—	—	—	—	—	—	—	X	—
Scottish Mechanical Light Industries, Ltd.	D.130	—	—	—	—	—	—	—	—	—	X	—	—	—
Turton Bros. and Matthews, Ltd.	D.413	—	—	—	—	—	—	—	—	X	—	—	—	—
Venning, John, and Co., Ltd.	D.241	—	X	—	—	—	—	—	—	—	—	—	—	—
Windsor, R. H., Ltd.	C.413 C.312	—	—	X	X	—	—	X	X	—	—	—	—	—



Daniels 125-ton automatic hydraulic preforming press. (T. H. and J. Daniels, Ltd.)



Upstroking press (25-ton) with push-back cylinder and automatic control unit. (Bradley and Turton, Ltd.)



Daniels 150-ton downstroke hydraulic moulding press, complete with automatic process timer. (T. H. and J. Daniels, Ltd.)

Preforming, Moulding and Extrusion Machines

B.I.P. Engineering, Ltd. (D.322)

At this stand may be seen the "Bipel" auto-control moulding presses. The Type 40 (20-40-60 tons) and the Type 100 (50-100-150 tons) both have self-contained drive units and are in operation; Type 200 (100-200-300 tons) is also shown, but is not in operation. All three models are available either as ring-main presses driven by a "Bipel" drive unit serving up to 12 presses; or with self-contained drive, as the presses exhibited. Shown for the first time is a new horizontal pelleting machine, hydraulically operated, making standard pellets of large size.

Bradley and Turton, Ltd. (D.237)

This company specializes in the manufacture of all types of presses and pumping equipment for compression and transfer moulding. They are showing their 70/20-ton semi-automatic hydraulic transfer press with self-contained pump unit and incorporating automatic control unit.

With the automatic control unit in circuit, the whole cycle of operations is entirely automatic from the time the operator has put the powder into the pot and closed the press guard, until the press has opened again and the moulding is ready to be taken out. A safety reversing switch is incorporated in the control unit to enable the operator to stop and reverse the press should an insert become displaced or for any other reason. The press can also be operated manually, and in this case an interesting feature is the control by one, only, two-spindle control valve. This valve controls the movement of the main ram, and the transfer ram operates automatically as soon as the mould is closed under pressure.

Finney 50-ton upstroke moulding press, with Greer-Mercier hydro-pneumatic accumulator. (Finney Presses, Ltd.)

T. H. and J. Daniels, Ltd. (D.310)

This exhibit comprises a preforming machine and a hydraulic press, which, in conjunction with a radio frequency heater, produces a typical phenolic moulding.

The preforming machine is the largest yet produced by this company, and one which should fill a long-felt need in the plastics industry. It is hydraulically operated, and exerts a maximum load of 125 tons on a 6-in. diameter tablet. Although the machine is shown producing a circular tablet, it may also be used to produce any other shape which will fit into a 6-in. diameter circle. The machine is arranged for fully automatic operation by means of a modified Daniels process timer and is driven by a self-contained pumping unit. The control valves are of the piston type, and attached to these valves are the air cylinders which are a part of the automatic control mechanism.

This preforming machine will handle fabric-filled materials if the filling is done manually; in this case the operation of the machine is semi-automatic, the operator starting the machine at the beginning of each cycle. One advantage of this machine when using materials of this type is that pressure is applied from both the top and the bottom of the tablet.

The hydraulic press, which is of the downstroke type, has a capacity of 150 tons. It is a self-contained unit having its own motor-driven high-speed pump and is complete with a Daniels automatic process timer, slowing device and delay valve which control the speed and amount of mould opening during "breathing." The press is fitted with 26-in. square electric platens and has a maximum daylight of 18 ins.

Davidsons Engineers (M/C), Ltd. (C.206)

The semi-automatic "Plasticor" injection moulding machine shown at this stand produces up to ¾ oz. (acetate) per shot. It is suitable for pre-loading inserts in the mould, and is foot-operated. The hopper capacity is 4 lb.; total pressure 3½ tons per sq. in. The mould is held and locked by means of a self-locking vice unit. A small air cylinder automatically releases the locked vice after each shot. A specially designed injection chamber, with leak-proof valve in the nozzle, can be supplied for moulding nylon.

E.M.B. Co., Ltd. (D.240)

This company's No. 20 diecaster is the sole exhibit at this stand, but the E.M.B. Co. are, of course, well-known makers of machines for injection moulding.

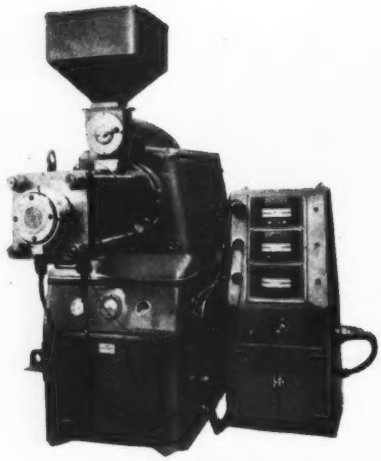
Fescol, Ltd. (D.652)

An electro-chemical deposition process applicable for the rebuilding of the worn parts of hydraulic rams is demonstrated by two large hydraulic rams, 20 ins. diameter by 4 ft. long, one in a badly corroded and corded condition before being "Fescol"-ised and the other after treatment. The striking contrast shown by these exhibits emphasizes the value of the Fescol process in combating corrosion, and also indicates what can be achieved in repair. Examples of small work handled by Fescol are also exhibited. Visitors to this stand will get a very clear idea of how "Fescol"-ising can renew worn parts and greatly prolong working life of new components.

Finney Presses, Ltd. (D.241)

Exhibits at this stand include the Finney 100-ton transfer moulding press; the 15-20-ton open-throat type downstroking press for arboring, assembly and straightening of machine parts; and the Greer-Mercier hydro-pneumatic accumulator. The latter equipment is used for storing fluid pressure, intensifying power in intermittent cycles, absorbing shocks at fluid pressure, dampening pulsations in hydraulic lines, and as a volume compensator and power conserver; the working pressure is 2,000 p.s.i. minimum, and 3,000 p.s.i. maximum.

The Finney 100-ton transfer press is of the four-column type, totally enclosed and completely self-contained. A two-stage pump unit, incorporated within the main control panel, is capable of delivering 20 gallons of oil per minute at 150 p.s.i. and 5 gallons per minute at 1½ p.s.i. With this pump capacity the following press speeds can be obtained: Approach speed of clamping ram, 1.125 in./sec.; return, 2 ins./sec.; approach speed of transfer cylinder, 1.125 in./sec.; return, 2 ins./sec. A 100-ton clamping cylinder with two 5-ton pull back rams are fitted for the control of the moving platen. Both the moving platen and the top fixed platen are "T"-slotted to facilitate the attachment of the moulds, and suitable mould stripping gear is mounted on hangar bars at each side of the press. The transfer unit is mounted on the top of the crosshead of the press.



Windsor RC. 200 plastics extruder. (R. H. Windsor Ltd.)

Foster, Yates and Thom, Ltd. (D.504)

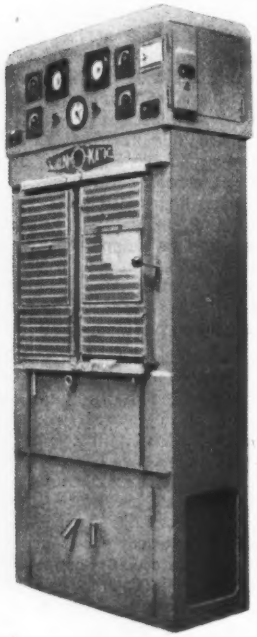
The "Lancastrian" 50-ton fully automatic plastics moulding press is a recent addition to this company's range of hydraulic presses. It is a fully automatic and self-contained unit. The press will mould up to six articles, having a total volume of 24 cubic ins. at each cycle. The automatic cycle includes the accurate measurement of the moulding powder, feeding to the moulds, pressing and de-gassing, opening, ejection of moulding and flash, cleaning of moulds, checking mouldings, and reinstitution of the cycle. The press frame provides for adequate rigidity and enables the pumping unit, all automatic controls and connecting piping to be housed within to form a fully self-contained unit. Throughout the period of the Fair, this press will be in operation producing mouldings for Joseph Lucas, Ltd.

The "Rotocube" industrial mixing machine also shown at this stand is used for mixing dry solids through the medium of a slowly rotating cube-shaped drum mounted diagonally on trunnions. Internal impellers can be used when blending ingredients do not flow readily or have a tendency to agglomerate. In addition to the improved accuracy of mixing, considerable reductions in blending times are claimed, and the effects of attrition or pulverizing are reduced to a minimum. An attractive feature is the ease with which the mixing container can be cleaned. Single and double pedestal models are available in a wide range of sizes.

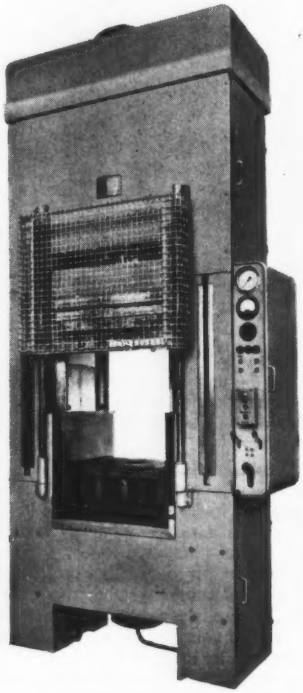
Alfred Herbert, Ltd. (D.310).

Injection moulding machinery on this stand includes the Herbert-Reed-Prentice 10D. 8 oz. and the "Edgwick" type HY machines.

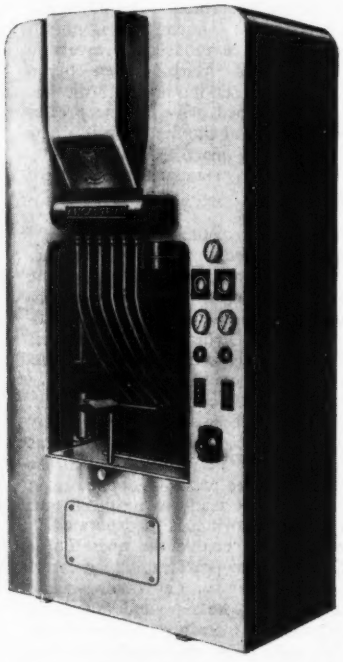
The Herbert-Reed-Prentice 10D. 8 oz. injection moulding machine is entirely self-contained and hydraulically operated throughout. It can be either full-automatic, semi-automatic (single automatic cycle) or hand operated, has a plasticising capacity of 45 lb. of cellulose acetate per hour and is



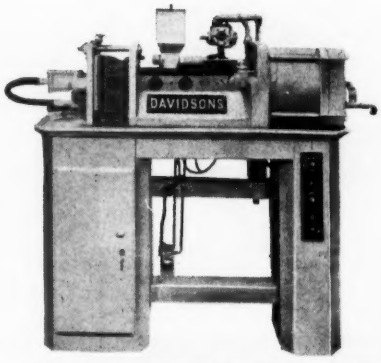
"Twin-o-Matic" 50-ton hydraulic moulding press. (Jackson, Heywood and Co., Ltd.)



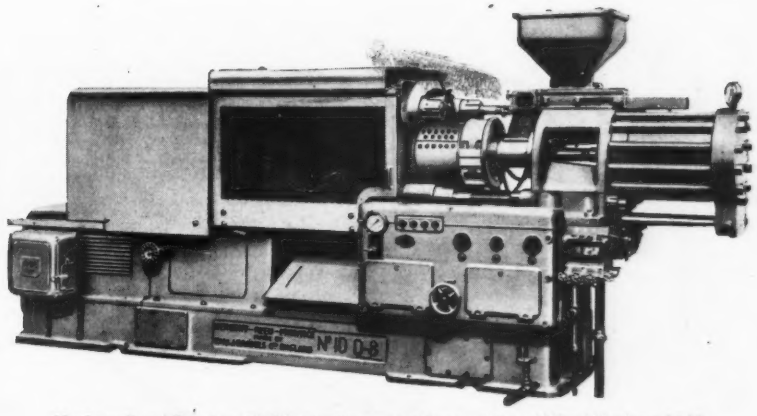
"Bipel" auto-control moulding press, Type 100 (50-100-150 tons). (B.I.P. Engineering Ltd.)



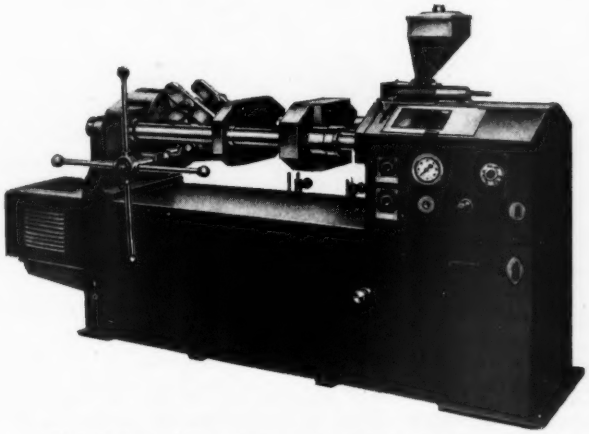
"Lancastrian" 50-ton fully automatic moulding press (Foster, Yates and Thom, Ltd.)



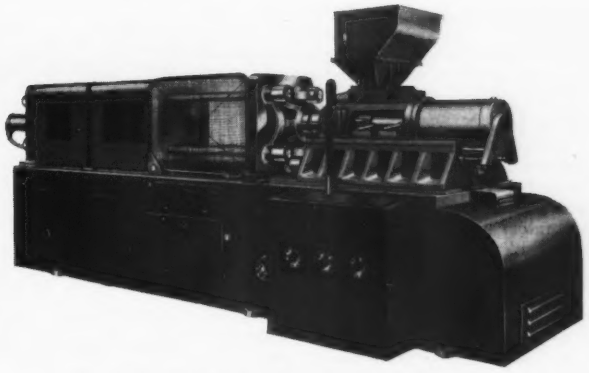
"Plasticor" ¾ oz. semi-automatic injection moulding machine. (Davidsons Engineers (M/C) Ltd.)



Herbert-Reed-Prentice 10.D8 injection moulding machine. (Alfred Herbert Ltd.)



"Edgwick" type HY semi-automatic injection moulding machine (Alfred Herbert Ltd.)



Windsor SH 8/10 injection moulding machine. (R. H. Windsor Ltd.)

hopper fed. A 2⅜-in. diameter plunger exerts a 20,000 lb. pressure per sq. in. The maximum area moulded is 100 sq. in., maximum weight 8 oz.

The "Edgwick" type HY injection moulding machine, seen in operation, is a self-contained fully hydraulic machine for moulding thermoplastics up to 1½ oz. A mould locking pressure of 30 tons is effected by a 9¼-in. diameter hydraulic cylinder assembly, coupled direct to the toggle unit. The powder feeding device is adjustable and self-compensating. This machine will be demonstrated on actual production.

Reference to the Daniels 150-ton downstroke press and the Daniels 125-ton hydraulic preformer is made elsewhere in these pages.

Jackson, Heywood and Co., Ltd. (C.612)

The range of "Twin-o-Matic" hydraulic moulding presses made by the company covers various sizes up to 500 tons. These machines are designed to take the compression moulds side by side. The total platen area of the "Twin-o-Matic" standard model is 336 sq. ins., each of the twin platens measuring 14 ins. by 12 ins.; oversize platens 17 ins. by 12 ins. can, however, be fitted to order. Total daylight is 21 ins., and each of the 8-in. diameter rams actuating the twin platens has an effective stroke of 8 ins. Each ram has a rated total pressure of 50 tons. The machine is entirely self-contained and requires only to be connected up to the nearest three-phase power point.

R. H. Windsor Ltd. (C.413/312)

This company make injection moulding machines with capacities ranging from 1 oz. to 32 oz. per shot; also multi-screw extrusion machines handling up to 200 lb. of plastics per hour. They show for the first time a new 1 oz. automatic injection machine, and are also demonstrating for the first time a system of extruding polystyrene on the BC.65 extruder. Other exhibits of plastics machinery include the SH.8-10 injection moulding machine, the RC.100 extruder (in operation making rigid p.v.c. piping, 2 ins. in diameter for use in the chemical industry), and the RC.200 extruder.

The new S.H.1 injection machine (1 oz.) is the smallest of the range of injection moulding machines made by R. H. Windsor Ltd. It occupies a floor space of only 96 ins. by 26 ins. and has a placticising capacity of about 10 lb. an hour. Although designed specially to fill a need in small-piece production on a semi- or fully-automatic basis, this machine has a locking load of 30 tons and exerts a 20,000 lb. pressure per sq. in. on the thermoplastic material. On a dry run 420 shots an hour have been recorded. With mould plates measuring 16 ins. by 11¼ ins., the maximum area moulded is 10 to 12 sq. ins. The safety of the operator has been looked after by interlocking the injection with the clamp, so that injection cannot take place until the machine is locked.

The injection assembly is based on the well-known Windsor retraction unit system, giving easy access to the sprue bush and material cylinder. When sprue break is required, the retraction unit can be actuated every stroke to the required amount. Hydraulic power is supplied by a Vickers V-139 U.S7 double pump.

Sprue Grinding Machinery and Other Accessories

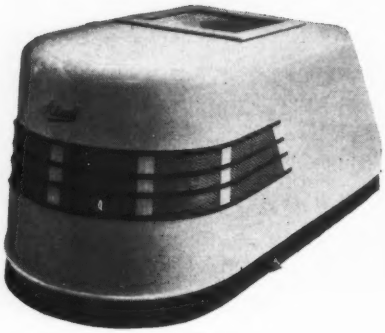
British Jeffrey-Diamond, Ltd. (D.528)

There is a machine in the B.J-D range of crushing, pulverizing and grinding machines for friable and semi-friable materials to suit product requirements from 8-in. cube down to minus 300 B.S. mesh, in capacities from a few hundredweights per hour to hundreds of tons per hour. Several of the machines can also be adapted for reducing fibrous materials. One feature common to all is their ability to produce the required product in one pass through the machine.

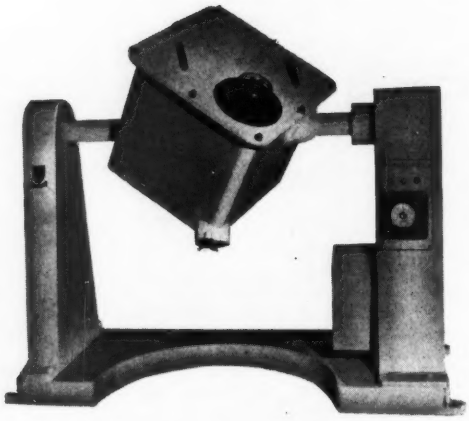
The "Atomill" is a completely self-contained unit. From feed material sizes up to ½-in. cube, it reduces certain materials to 300 B.S. mesh in one operation. It can handle up to 40 cwt. per hour, depending upon the type of material and product size.

The "Microid Atomill" is a high-speed swing hammer pulverizer employing the same principles of construction as the "Atomill," and though designed principally for laboratory work it is robust enough for

Laboratory grinding mill (Christy and Norris, Ltd.)



(Above) 10 ins. x 5 ins. "Atomill" a completely self-contained pulverizing unit. (British Jeffrey-Diamond, Ltd.)



"Rotocube" mixing machine (Foster, Yates and Thom, Ltd.)

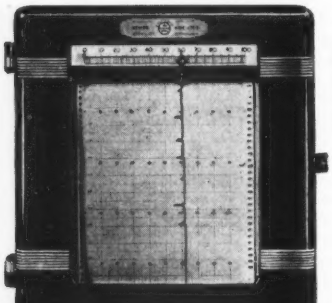
small batch production. It is capable of reducing a variety of materials, ranging from samples weighing a few grams to those weighing several pounds to products between 50 and 300 B.S. mesh.

Christy and Norris, Ltd. (D.403)

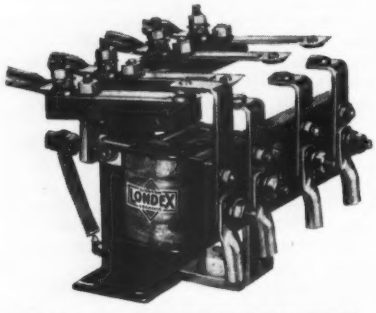
This company have supplied all types of equipment for grinding plastic sprues, depending upon the size of sprues and the quantities to be ground. Their 8-in. laboratory mill shown is in considerable use for grinding up small sprues.

Scottish Mechanical Light Industries, Ltd. (D. 130)

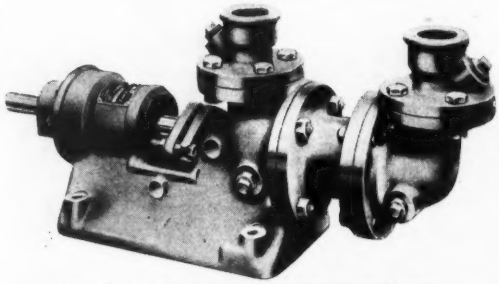
This company's "GR/44" industrial hammer mill is made on a patented principle co-ordinating the air-flows created by the disintegrator and the suction blower respectively, thus completely eliminating thereby the possibility of clogging.



"Widestrip" potentiometer for tool-room use. (Ether, Ltd.)



L.B. 15 amp. contactor for plastics moulding presses. (Londex, Ltd.)



Type D "Mono" pump for formaldehyde resins and other viscous liquids. (Mono Pumps, Ltd.)

Mono Pumps, Ltd. (D.716).

One of the pumps shown on this stand is pumping a heavily viscous mixture. This display demonstrates the suitability of the pump for formaldehyde resins and cellulose acetate.

Ether, Ltd. (C.700)

Electronically operated instruments, designed mainly for temperature measurement and control, are exhibited for the first time. An Ether "Widestrip" potentiometer, type WSP/E, is in operation. This is an electronically operated potentiometer recorder with a chart width of 10 ins. and a speed across the chart down to two seconds. It forms an accurate instrument for the measurement of temperature or any other physical value which can be electrically expressed. In the tool-room it can be used in the operations of hardening moulds and dies.

The Ether-Wheelco panelmount capacitrol, type E.W.245P, made under licence from Wheelco Instruments Co., of Chicago, is extensively used on injection moulding machines for the measurement and control of nozzle temperatures.

Londex, Ltd. (C.722)

Here is to be seen a wide range of relays, timers, pressure switches, flow indicators, level controllers, light-ray equipments and other automatic control apparatus. Among exhibits of particular interest is the multi-contact type LF relay in a new case. This is one of the most widely used of industrial relays and will operate either from D.C. or directly from A.C. mains. The new style pressed-steel case gives the degree of protection needed in many industrial situations and at the same time provides excellent access for connecting conduit and wiring.

A modified version of the new LB 15 amp. contactor has a ball-bearing hinge arrangement and is specially designed to withstand the thousands of cycles of operation and release which occur each day in plastics moulding machines. It is also noteworthy as being one of the few contactors that can have "break" as well as "make" contacts.

P.A.M., Ltd. (C.505)

A new method of presenting this company's well-known temperature controllers will be of interest. They have been investigating the problems of temperature control in plastics extruders. Difficulty often arises due to the fact that there are two sources of heat—the heaters themselves and the frictional heat generated in the material. The study of this problem has made interesting research work and technical representatives will be pleased to demonstrate various findings on the actual test gear used for this work.

Newton Victor, Ltd. (C.709)

X-ray equipment for industrial purposes is exhibited here, the chief interest being centred on practical working demonstrations of fluoroscopic examination with the "Raymax 140" unit. This equipment is particularly suitable for the radiography of a wide variety of synthetic materials, including plastics mouldings and laminated products.

B.I.P. Tools, Ltd. (C.319)

Here may be seen an induction-heated button mould; also shown are examples of hobs and hobbings, thread-milling and shape-turning.

Summary of Plastics and Allied Exhibits (excluding Plastics Machinery) at Castle Bromwich

SECTIONS A AND B. HARDWARE AND BUILDING

	Stand No.	
British Celanese Ltd.	A.327	Cellulose acetate plastics, including "Celastoid" extruded tubes and sections, and "Clarifoil" transparent film for visual packaging.
Cellon Ltd.	B.527	Lacquers for phenolics and polystyrene. "Birlon" temporary protective coating.
Evered and Co. Ltd.	B.327	"Everite" plastics builders' hardware in a wide range of designs.
McArd, Robert, and Co. Ltd.	B.619	"Celmac" plastics lavatory seats (black and colours). Moulded components for textile machinery and general engineering. Trade mouldings.
Precision Plastics Ltd.	A.607	Plastics bottle closures and trade mouldings. Plastics "kitchen aids," and mouldings for holloware trade.
Shires and Co. (London) Ltd.	B.700	Lavatory seats in moulded plastics (black, walnut finish and standard colours). Moulded cisterns in black "Duranite" bituminous compositions. "Poly-Flush" plastics flush piping, and cistern floats in moulded polystyrene.

SECTION C. ELECTRICAL

	Stand No.	
Bakelite Ltd.	C.404	"Bakelite" synthetic resins, and phenolic and urea moulding powders. "Bakelite" laminated sheet, rod and tube. "Vybak" extrusion and calendering compounds, and rigid sheet. "Warerite" laminated panels and veneers.
Birkbys Ltd.	C.314	"Elo" phenolic moulding powders and mouldings, with applications in electrical industry, radio, building, textile machinery, aircraft, shipbuilding and mining. Anti-friction resins, insulating varnishes and capping cements.
British Geon Ltd.	C.618	Showcase C. "Geon" polyvinyl chloride as cable dielectric and sheathing material, with special emphasis on low flammability.
British Industrial Plastics Ltd.	C.618	Showcase H. "Beetle" urea and melamine moulding powders. "Beetle" adhesives and coating resins. "Beetle" bonding resins for foundry sand cores.
British Insulated Callender's Cables Ltd.	C.216	Winding wire with insulating film of polytetrafluoroethylene 1/1000-inch thick; electric cables, sleeving and other accessories.
British Moulded Plastics Ltd.	C.614	Compression and injection mouldings for the electrical industry; also extrusions. Moulded radio and television cabinets. Moulded parts for all-electric spray gun. A large phenolic moulded casing for a water heater. Special purpose mouldings in nylon.
British Resin Products Ltd.	C.618	Showcase B. "Cellomold" cellulose acetate moulding material. "Rockite" phenolic and urea moulding materials. "Epok" synthetic resins for laminating and surface coating. "Cellobond" resin adhesives.
Burns, J., Ltd.	C.618	Showcase E. Machined laminates in form of gears and general engineering components.
Cascelloid Ltd.	C.618	Showcase D. Injection mouldings for all trades. Polythene layflat bags for protection of products against atmospheric corrosion. Polythene flexible bottles and containers.
Clang Ltd.	C.215	Moulded electrical accessories and conduit fittings.
Cole, E. K., Ltd.	C.618	Showcase A. Productions of a comprehensive plastics moulding service for electrical and other industries, including compression and injection mouldings and extrusions.
Coventry Motor and Sundries Co. Ltd.	C.618	Showcase F. Thermosetting moulding for electrical, general engineering, textile and railway industries. Extrusions in all types of extrusion compounds, including the "Swish" curtain rail in polyvinyl chloride.
Crystalate Ltd.	C.618	Showcase K. Moulded components in all plastics, with services including design, tooling, moulding, assembling and packaging.
Davis and Timmins Ltd.	C.316	Metal inserts for plastics mouldings.
Ebonestos Industries Ltd.	C.618	Showcase K. Mouldings in synthetic and natural resins, and bitumen, for electrical, scientific instruments, telephone, motorcar, aircraft, building and general engineering uses.
FitzGibbon and Murray Ltd.	C.113	Ebonite turnings for the electrical industry.
I.C.I. Ltd., Plastics Division	C.618	Showcase L. "Fluon" (polytectrofluoroethylene) and polyvinyl chloride for electrical insulation uses. Nylon moulding powder. Raw materials generally for plastics moulding.
Joseph Lucas Ltd.	C.501	Moulded components for motorcars, aircraft, etc.
Melwood Thermoplastics Ltd.	C.618	Showcase I. Extrusions for industry generally, including electrical and leather goods trades. Extruded curtain rail. Cellulose acetate-butyrate tool handles.
Mica Products Ltd.	C.618	Showcase K. Moulded, fabricated, machined and stamped plastics for all trades. Laminated tubes, bobbins and formers. Plastics mica insulation components.
Moulded Products Ltd.	C.614	Mouldings for electrical and general engineering uses. Moulded lavatory seats, motorcar facia boards, and firemen's helmets.
Permali Ltd.	C.220	Phenolic laminates and rods and tubes. "Permali" and impregnated paper electrical insulations for high voltage. Insulating fishplates for railway track circuit control; textile machinery parts and silent gears; bearings and stressed parts for coal-cleaning equipment.
Pirelli-General Cable Works Ltd.	C.216	Insulated electric cables and flexibles.
Punfield and Barstow (Mouldings) Ltd.	C.618	Showcase J. Special purpose mouldings in nylon, including gear wheels for impeller pumps, electrical bobbins, hypodermic needles and other surgical equipment, textile machinery components.
Resinoid and Mica Products Ltd.	C.505	Machined components in laminated sheet and rod; compression and injection mouldings for a range of industries.
Streetly Manufacturing Co., Ltd.	C.307	Trade mouldings in urea, melamine, phenolic and thermo-plastic materials. "Beetleware" mouldings for domestic use.
Telegraph Construction and Maintenance Co., Ltd.	C.216	"Telcothene" (processed polythene) mouldings and extrusions for electrical and chemical plant uses, also laboratory ware. "Telcothene" powder for coating metal by special technique.
Tufnol Ltd.	C.618	Showcase M. Gear wheels, bearings and other engineering components, as produced from "Tufnol" laminated products.
United Ebonite and Lorival Ltd.	C.618	Showcase N. Mouldings for textile, transport, television, radio, aircraft, mining, building and electrical industries. Pulleys in shock-resisting material with moulded-in "Skefko" ball bearings.
Universal Metal Products Ltd.	C.618	Showcase G. Compression and injection trade mouldings for engineering, electrical, radio and motorcar industries. Injection-moulded battery boxes.

Summary of Plastics and Allied Exhibits (excluding Plastics Machinery) at Castle Bromwich—*continued.*

SECTION D. ENGINEERING	Stand No.	
Airscrew Co. and Jicwood Ltd.	D.726	"Weyroc" man-made timber bonded with urea-formaldehyde resins.
B.B. Chemical Co., Ltd.	D.209	"Bostik" adhesives and sealing compounds for aircraft, building, motorcar, radio and other industries.
British Ropes Ltd.	D.351	"Viking" nylon rope, and woven nylon cloth.
Capon Heaton and Co. Ltd.	D.712	Extrusions in rigid and non-rigid plastics for motorcar, electrical and aircraft industries, and for domestic use.
Dunlop Special Products Ltd.	D.719	Polyvinyl acetate emulsions, moulding, casting and spreading products.
Empire Plastics (Birmingham) Ltd.	D.768	Mouldings for the engineering trades.
Fibreglass Ltd.	D.312	Fibreglass cloth and mat for plastics laminates.
Gandy Ltd.	D.147	Applications of plastics to conveyor and power transmission belting.
Hall and Hall Ltd.	D.729	Synthetic rubber mouldings and extrusions.
Hertfordshire Rubber Co. Ltd.	D.619	Mouldings and extrusions in synthetic and sponge rubber.
I.C.I. Ltd., Plastics Division	D.412	Applications of "Alkathene" (polythene) film for packaging small tools and engineering components. "Fluon" (polytetrafluoroethylene) for chemical plant uses. Nylon moulding powder.
India Rubber, Gutta Percha and Telegraph Works Co., Ltd.	D.615	Ebonite sheet, rod and tube; also mouldings and fabricated components.
Ioco Ltd.	D.701	Applications of resin-bonded laminates to silent gears and electrical insulation. Vinyl-coated leathercloth.
Merrill Pumps Ltd.	D.747	Glandless self-priming tube diaphragm pumps incorporating polythene neoprene, rubber and ebonite parts.
Morgan Ebonite Co., Ltd.	D.615	Ebonite rods, sheets, tubes and mouldings.
Nordac Ltd.	D.144	Acid-resisting tank linings and valves.
Northern Rubber Co., Ltd.	D.733	Moulded articles in synthetic rubber.
Prodorite Ltd.	D.431	Polythene pipes—spun and extruded—for corrosion resistance in all industries; also tank linings and ducting.
Rubber Bonders Ltd.	D.650	Designed parts in rubber bonded to metal; vibration and noise-damping devices.
Thor Hammer Co.	D.324	Hammers and mallets with renewable polythene heads.

Tool Room Equipment

Over 40 of the 236 member-firms in the Gauge and Tool Makers' Association are displaying a range of their manufactures and sales literature on a composite stand (C. 319). Exhibits by some of the participating members are as follows:—

Aldridge Tool and Engineering Co., Ltd.—Milling cutters, die-sinking cutters, reamers, etc.

Arnott and Harrison, Ltd.—Selection of jigs, fixtures and press tools.

Benrath Machine Tools, Ltd.—Machine for the balancing of cutters, chucks, fixtures, grinding wheels, etc.

B.I.P. Tools, Ltd.—A button-moulding tool, together with examples of hobs and hobbings, thread-milling and shape-turning, all the pieces concerned having been made for incorporation in plastics moulding tools.

Birmingham Tool and Gauge Co., Ltd.—Standard milling cutters and end mills, standard and special tungsten carbide tipped tools and a special profiling cutter.

T. Bowers and Co.—Internal micrometers and various types of special tools, cutters and reamers.

Brooke Tool Manufacturing Co., Ltd.—Twist drills, core drills and reamers.

B.S.A. Tools, Ltd.—Sintox ceramic tools.

Cabul Tool Co., Ltd.—A Penetrascope portable hardness tester.

Coley Bros. (Tools), Ltd.—Typical press tools, together with samples, employing the use of their standard die sets.

Coventry Gauge and Tool Co., Ltd.—Internal micrometers, for the precision measurement of bores from ¼ in. to 8 ins. These instruments measure bores directly to extremely fine limits, thus maintaining the accuracy of a product during mass production. Equally effectively, the instruments can be used for high precision inspection as they enable the inspector to check diameter and parallelism.

Diapol, Ltd.—Diamond tools, including single and multiple point grinding-wheel dressers and standard drilling bits.

Dowding and Doll, Ltd.—Thread milling hobs—both shell and shank type, single disc cutters, chase holders and chasers.

Ferrostatics, Ltd.—Part of an injection mould for textile pirn, and rubber transfer mould for an intricate component, together with samples of mouldings in plastics and rubber.

Firth Brown Tools, Ltd.—Small precision cutters and saws.

Fox and Offord, Ltd.—A range of moulds and dies, together with sample plastics mouldings (thermosetting and thermoplastic).

G.P.A. Tools and Gauges, Ltd.—Small precision gauges, jigs and samples of components completely tooled.

Hall and Pickles, Ltd.—"Hydra" tools, including a large form relieved profiling cutter, also special-purpose reamers.

John Harris Tools, Ltd.—Workshop gauges, including internal indicator gauges, screw plug gauges, screw ring gauges, etc.

Impregnated Diamond Products, Ltd.—"Neven" tools, including internal grinders.

Indusmond (Diamond Tools), Ltd.—A range of diamond tools having wide application in industry; diamond drills in sizes from 5/32 in. (drilling 2,000 holes in ¼-in. plate glass).

Leytonstone Jig and Tool Co., Ltd.—Hand drills, ratchet spanners and endless hack-saws, together with examples of jigs, fixtures and plastics moulds.

Richard Lloyd, Ltd.—Serrated blade cutters for milling, facing, boring and reaming.

M.P.J. Gauge and Tool Co., Ltd.—Grinding gauges, sheet thickness gauges and tube wall thickness gauges.

Nuckey, Scott and Co., Ltd.—Cut thread and ground thread taps and dies.

Pitter Gauge and Precision Tool Co., Ltd.—Slip gauges and accessories, length gauges and accessories, stick and bench micrometers, measuring cylinders and prisms, plain plug and screw thread gauges, polygon, sine bar, snap gauges, optical flats and toolmakers flats.

Protolite, Ltd.—"Prolite" cemented tungsten carbide products; tips and tipped turning, boring and facing tools; tools for threading machines, and "Prolite" rotary burs and solid cemented tungsten carbide drills.

J. B. Purefoy Unit Tooling, Ltd.—"Purefoy" standard parts for rings and fixtures.

Redman Tools and Products, Ltd.—Typical models of the "Unipierce" and "Unicrop" system of tooling. The "Unipierce" units pierce round or irregular shaped holes and perform compound operations in metal, asbestos, and plastics sheets, angles, channels, and lamination iron. The "Unicrop' units crop corners and edges of sheets.

Reliance Precision Tools, Ltd.—Standard and special ground form thread milling cutters.

H.B. Sale, Ltd.—Moulding tools, together with various inserts and parts of moulds.

Ambrose Shardlow and Co., Ltd.—Micrometers of all types.

Talbot Tool Co., Ltd.—"Grip" drill jig bushes, and toolmakers' buttons.

Toolmasters, Ltd.—The new "Diaform" wheel-forming attachment which, tracing from templates, will form dress wheels to "tenths" by means of a dressing diamond. It operates on the pantograph principle, tracing from a 10-to-1 ratio template with such fidelity and rapidity that the dressing operation for a complex form can be completed in a matter of minutes.

Truform Gauge Co., Ltd.—Precision gauges including receiver type gauges, spline and serration, plug and ring gauges, and samples of intricate profile grinding.

S. L. Van Moppes, Ltd.—Various diamond tools, including dressing tools (general purpose, five-in-line, multi-cluster, and multi-dresser), turning and boring tools (swivel head, offset turning, fountain pen boring bar), thread grinding tools.

E. R. Varney, Ltd.—Spiral ratchet screwdrivers, archimedian drills and drill chucks.

Wickman, Ltd.—Carbide pieces of various shapes as employed by toolmakers.

A Curious Type of Fault in Insulated Submarine Cables

IN the autumn of 1948 a "Telcothene"-insulated submarine cable was being laid in deep water off South America. During this operation it became necessary in an emergency to buoy one end of the cable for 48 hours on the surface, with a great length trailing down to the sea-bed at a depth of 2,500 fathoms. When the cable ship returned to recover the cable, a peculiar fault was discovered. As the cable end was hove inboard and coiled down on deck, the copper conductor, leaving its more normal position at the centre of the insulation, made its appearance between the armour wires, protruding in a loop or "knuckle" every few feet or so along the length of cable which had been suspended between the buoy and the sea bottom. Fig. 1 shows one of the faults actually found.

Fig. 1.—"Knuckle-up" fault in insulated submarine cable.

In this way began an interesting study into the behaviour of armoured cables under working conditions, which is reported by Miss Beryl F. Thorne, B.Sc., A.Inst.P., in a recent issue (No. 15) of the "Telcon House Magazine," published by The Telegraph Construction and Maintenance Co., Ltd., of Greenwich, London, S.E.10.

It was fairly easy to arrive at a rough idea of the origin of this particular fault, which has been termed "knuckle-up." The copper is stretched beyond the so-called "elastic limit," that is, it is stretched to a state where it will not return to its initial length when the load on it is removed, but will remain somewhat longer. On the other hand, "Telcothene" stretched by the same amount as the copper will attempt to recover more than the copper. In this attempt it will tend to slide over the copper, which will then be too long for the composite structure. The knuckle fault is formed by the failure of the conductor and insulator to withstand the forces placed on them. The same action does not occur with gutta-percha, as it is not nearly as "elastic" as is "Telcothene."

Interesting models were produced at this stage in the investigation to show the "knuckle-up" effect. They were made by placing a copper conductor inside a plastic tube, stretching the tube over the copper, securing the ends and releasing the whole. The results are shown in Figs. 2 to 6, and are very similar in form to those shown by the actual cable.

An attempt was then made to produce "knuckle-up" by stretching unarmoured submarine cable core of various sizes and under various loads. It was never found possible to produce a fault where the copper punctured the "Telcothene," even although the core was stretched by as much as 10 per cent., and end effects were eliminated by using a test sample in the form of a continuous loop. In use, a submarine cable can never be stretched by more than about 5 per cent., so it was obvious that stretch alone could not be the cause of the fault. Because of this failure to obtain faults in core the possible effect of the armour was considered.

Any laid-up structure such as armour wires around a central core decreased in diameter on stretching; at the same time it squeezes the central core. The effect is well known in the case of wire braid. Further, any laid-up structure tends to "unlay," if a load is applied to a free end; this is familiar in the case of a wire crane rope which always spins when the load is attached. Theoretically, spinning occurs because

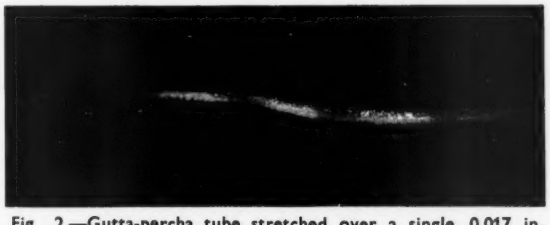


Fig. 2.—Gutta-percha tube stretched over a single 0.017 in. copper conductor and released. No faults are produced.

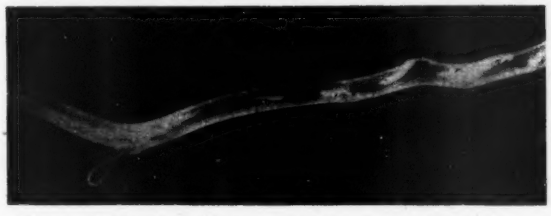


Fig. 3.—"Telcothene" tube stretched over a single 0.017 in. copper conductor and released. The retraction of the "Telcothene" forces the copper through the tube in the form of a loop.

Fig. 4.—Indiarubber tube stretched over a stranded copper conductor and released. The conductor is forced through the tube in several places.

Fig. 5.—"Telcothene" tube, 0.2 in. external diameter, stretched over a stranded copper and released. There is sufficient room within the tube for the elongated strand to accommodate itself in a distorted form.

Fig. 6.—"Telcothene" tube, 0.15 in. external diameter, stretched over a conductor similar to that used in Fig. 5 and released. In this case the distorted strand cannot be accommodated with the tube, and a "knuckle-up" fault commences to form.

the tension in the wires is not at right angles to the cable axis so that forces exist tending to twist the cables around its axis. Any free end must continue to rotate until these forces are reduced to zero, and under these conditions the lay is considerably lengthened. The magnitude of both effects depends on the length of lay of the armour.

The compressive and twisting actions of the armour were considered to exert forces on the core, tending to cause differential movement between the copper and "Telcothene" and thus allow the copper to be free to protrude. The effect of compression on the core may be compared to the effect produced by lightly rolling a pencil over a tube of toothpaste, with the cap off.

Because the presence of the armour appeared to be necessary to produce the faults, it became evident that samples would have to be tested in the armoured state on a large scale. Initial experiments were made by stretching about 20 ft. of armoured cable between two 10-ft. drums, one drum being driven by a steam engine while the cable end was made fast round the other drum. Loads were then measured using a Duckham hydrostatic instrument. Even under these crude conditions useful information was obtained to show the lines along which further developments should proceed.

It became necessary, however, to distinguish between two types of faults which were termed "knuckle-up" faults and "spews."

The "knuckle-up" fault is defined as one in which the copper penetrates the dielectric. It is caused by relative movement between the copper and the insulator. A "spew," on the other hand, is a fault in which the core penetrates the armour, but the insulation remains intact. This is caused by relative movement between the core and the armour. "Spewing" occurs in gutta-percha as well as "Telcothene"-insulated cables, although not to the same effect.

Treating each component of the cable in turn, modifications which would tend to reduce knuckling and spewing are summarized as follows:—

(1) CONDUCTOR.—Ideally this should adhere perfectly to the insulation so that no relative slip is possible between the two. The use of so-called "covering compound" over the conductor is undesirable as it acts as an efficient lubricant. If these conditions cannot be satisfied then the conductor should be made as rigid as possible, thus increasing the "collapse length" at which failure occurs due to the compressive forces imposed by the "Telcothene." It must not be possible for one component of the conductor to slide relative to the others.

(2) INSULATOR.—The insulator should have elastic properties as nearly as possible equal to those of copper. This would prevent knuckle formation, but would not prevent "spewing." The insulator should also be as tough as possible so that it has the strength to resist the force of the copper trying to puncture it.

(3) CORE SERVING.—A tight core serving can reduce the tendency to knuckle by restricting the movement of the core. At the other extreme, an intermittent core serving may also reduce knuckling by allowing space for the core to take up a wavy form inside the armour after stretching and release.

(4) ARMOUR.—The armour should be applied with the longest lay possible. This is governed by practical considerations, e.g., the cable must not be so "loose" that it tends to open during handling in the works and at sea. The long lay reduces the compressive force exerted on the core and also reduces unlay and the resulting extension under free loading. An armouring of high tensile steel wires is more conducive to knuckling than one of lower tensile steel, due to the shape of the load/elongation curves of the different steels at high loads. If the cable were armoured with two layers of wires laid on in opposite directions, there would be no tendency for the end to untwist under load.

LETTERS TO THE EDITOR

Cellulose Acetate Film Lamination

SIR,—We have read with interest the article on page 74 of the March, 1952, issue of "Plastics" concerning the lamination of cellulose acetate film to printed matter, by means of adhesives, as a continuous process.

We note the claim is made that this is a new process developed in Denmark and brought to this country. Whilst we know that Danish plant has in fact been imported into this country for this purpose, we feel that we must point out that this company developed and produced such plant over three years ago.

We have been carrying out the lamination of 0.001-in. thick cellulose acetate film to pressboard and presspaper for electrical insulation purposes, in continuous lengths since April, 1949, when our "Symax" insulation made in this way was first placed on the market. In July, 1950, we commenced to treat printed matter in the same way for various printers and publishers, and a considerable number of showcards, book jackets, etc., treated by us in this way have been produced since that time.

We would like to emphasize that in this case, the development of the technique and of the adhesives, together with the design and construction of the plant, which is capable of treating materials both in continuous length and sheet form, was of entirely British origin.

H. D. SYMONS AND CO., LTD.
Park Works, Kingston Hill, Surrey.

Laminates

SIR,—We should be obliged if you would tell us if there is a form of sheet plastics similar to that which was known as "Heralith."

LONDON SAND BLAST DECORATIVE GLASS WORKS LTD.
Seager Place, Burdett Road, E.3.

[EDITOR'S NOTE: The reader probably refers to "Herolith." The trade name given to a series of phenolic formaldehyde resins manufactured by Herold A.G., of Hamburg. Presuming that the sheet is to be sand blasted, a phenolic laminated or cast phenolic sheet is indicated.]

Polythene

SIR.—Could you put us in touch with the manufacturer of polythene membrane or foil, as mentioned in articles in "Plastics" in 1950?

THE PRESCO CO. LTD.
11a, Webster Avenue,
Toronto, Ont.

[EDITOR'S NOTE: The author referred to the use of polythene membrane in the floors of chemical factories to protect the foundations and floor reinforcements from attack by acids, alkalis and other chemicals. The foil (0.010-in. thick) is supplied in rolls 46 ins. wide and 100 yds. long by I.C.I. Plastics Division.]

Spray-formed Ornaments

SIR,—I have an illuminated "owl" fabricated from plastic as an ornament made, on a wire skeleton, I believe, by the "cocoon" process. I am anxious to find the makers. Can you help me?

W. J. COOKE.
270, Welford Road, Leicester.

[EDITOR'S NOTE: Manufacturers of this type of structure, similar to those seen at the Festival of Britain, are: Franco Signs, Ltd., 15-17, King Street, London, S.W.1, and W. S. Chrysaline, Ltd., 282, High Street, Berkhamsted, Herts.]

Plating on Plastics

SIR,—We should be pleased to learn if you can give us any information on the plating of thermoplastic mouldings with gilt or silver finishes. Information, and names of trade platers or manufacturers of equipment, would be appreciated.

ROLLRITE PLASTICS.
Bastion Mews, Hereford.

[EDITOR'S NOTE: Electroplaters include Metaplast, Ltd. (England), Ltd., Bath Road, Harmondsworth, Middlesex; Alma Plating Works, Ltd., 5/7, Broadway Mews, Bowes Park, London, N.; the vacuum vapouring process, for the trade, is used by V.M.C. Co., Ltd., Croydon.

World's Industry Employs Plastics

INDUSTRIAL APPLICATIONS

Consolidating sand formations. — The methods and experiences of 37 cases of the application of plastics in the consolidation of sand formations have been compiled by H. B. Ritch and P. H. Cardwell. ("World Oil," 1951/No. 7/177.)

Plastic tooling at Lockheed Aircraft Corp.—An article deals with tools of phenol resin for shaping of light-metal components. ("Aviation Week" (N.Y.), 1952/**56**/1/42.)

Plastics in the paper industry.—H. Willinger has read a paper on new developments due to the collaboration of the producers of plastics and paper. ("Prakt. Chemie" (Vienna), 1951/No. 12/272.)

Polystyrene foam material as insulator for cables and conductors is described in detail by F. Heitzmann. ("Kunststoffe," 1952/Feb./29.)

Nylon holders for felt polishing wheels have been developed by Detroit Mold Engineering Co., 6686, E. McNicols Road, Detroit, 12, Mich., U.S.A. Nylon is moulded around a ⅛-in.-diameter steel mandrel insert. Produced with ¼-, ½-, and ¾-in. diameter. ("Products Finishing," 1952/Feb./126.)

Phenolics in telephone equipment.—In a new switchboard assembly for automatic dial exchanges the common control proceeds from call to call like a human operator. Phenolic resins are used throughout in construction of relays, jacks and multiple guides. ("Materials and Methods," 1952/Jan./95.)

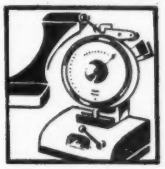
The locking of threaded parts by liquid plastic compositions has recently been tested by S. S. Stivala in the Ordnance Corps Plastics Laboratory. Polyesters provide controllable resistance to torque in threaded parts. ("Machine Design," 1952/Feb./127.)

Liquid phenolic binder is used for producing stronger sand cores.—The General Electric Co.'s resin GE12353 has high water dilution and good handling characteristics. The resin may be used as a spray to increase the hardness of oil- or resin-bonded cores. ("Machinery" (N.Y.), 1951/Dec./184.)

Designing with laminated plastics.—B. L. Hummel gives a survey of laminated plastics and how components of best value can be cut out of these materials with due consideration of the laminations. ("Machine Design," 1952/Mar./112.)

Fibre glass reinforced Alkyd moulding compound is produced by Plaskon Div., Libbey Owens-Ford Glass Co., Toledo, Ohio. It is said to have higher impact strength than any other plastic material and can be moulded at high production rates by usual plastic moulding methods. Claimed to have expanded military and civilian uses, its high strength makes it suitable for body armour and structural aircraft components. ("Materials and Methods," 1952/Jan./122.)

MATERIALS and TESTING



Foamed materials.—F. Lober deals with the development and the importance of materials used in the production of foamed materials from rubber and plastics. ("Angewandte Chemie" (Weinheim), 1952/**64**/3/65.)

Degradation and weathering of plastics.—A. B. Burgess describes the chemical processes of degradation in plastics materials. "Chemistry and Industry," 1952/No. 4/78.)

Polyvinyl compounds as synthetic fibres. P. A. Hoch gives a detailed tabulated survey of this development. ("Deutsches Textil-Gewerbe" (München-Gladbach), 1952/No. 1/46.)

Electrification of "Perspex."—M. J. Morant and W. K. Mansfield studied the charging of "Perspex" under compression. Unexpectedly the material became electrified when compressed between point and plane brass electrodes. It is suggested that the charge transference is proportional to the contact area. ("Nature," 1952/March 22/499.)

Hard rubbers and resin rubber blends are treated from the point of view of properties and application. For strength properties, high chemical resistance and good dimensional stability, hard rubber is hard to beat. ("Product Engineering," 1952/Feb./168.)

Metallized acetates are now made in lighter weights by Coating Products, 136, W. 21 St., New York. The material is available in a 0.001-in. thickness in eight colours. ("Materials and Methods," 1952/Jan./124.)

A quickly hardening casting resin produced by Rezolin Inc., Los Angeles, Calif., has been obtained by addition of a liquid accelerator, no heating being required. Control of hardening time is possible by varying the amount of accelerator. ("Machinery" (N.Y.), 1951/Dec./185.)

The testing station for plastics of the Staatliche Materialprüfungsanstalt, Darmstadt, is described by C. M. v. Meysenbug. ("Kunststoffe," 1952/Feb./35.)

MISCELLANEOUS USES

Leather substitutes. — Styrene-butadiene copolymers have been introduced on the American market as leather substitutes for soles, suitcases, etc. ("Chem. Week" (Philadelphia), 1951/No. 69,23/33.)

Resin impregnation improves parachute harnesses for the safety of fliers. Materials Laboratory, Air Material Command, presses polyvinyl-butyral (Merlon BR) into the webbing of parachute harnesses. ("Machine Design," 1952/Feb./131.)

Strain-free replicas for Electron-Metallography.—W. L. Grube and S. R. Rouze describe a new technique which does not subject "Formvar" (polyvinyl formal) to undue stress and which will result in a stress-free replica. ("A.S.T.M. Bulletin," 1952/Jan./71.)

COATINGS and ADHESIVES

Protecting metals by silicones. — A longer service life due to superior heat and weathering resistance, often justifies the use of silicone finishes in place of lower-priced conventional coatings. ("Materials and Methods," 1952/Jan./82.)

Heat-resisting aircraft finish.—Tests of heat resistant coatings for jet aircraft cowlings and fuselage adjacent to the jet exhausts show that silicone base finishes are the only suitable finishes for temperatures up to 750 degrees F. Conclusions of tests and formulæ for silicone finishes are given. (R.E. Clements, U.S. Naval Air Material Centre Report. A.M.L. AE424330/Sept. 1949.)

Melamine resins in the wood industry.—After discussing the properties of the resins, R. Köhler and W. Enzensberger discuss the application of these resins for the glueing of laminated woods, such as plywoods, veneers, etc. ("Holz als Roh-und Werkstoff," 1952/Feb./51.)

Metal adhesives.—Survey by K. S. Meakin of the rapid advances in the development of adhesives, in particular, joining of metals under critical conditions, as in modern aeronautical practice. ("Research," 1952/March/126.)

Rubber adhesives.—The non-rigid or flexible bonds are useful in many engineering applications. Comparative data for rubber used in adhesives are given, bonding techniques and applications described. ("Product Engineering," 1952/Feb./130.)

Use of Air-gap Insulation in Plastics Moulds

By WILLIAM KOSOBUD*

This paper was awarded the Second Prize in the 1951 Prize Paper Contest organized by the Society of Plastics Engineers, Athens, Ohio. It is here reprinted from the S.P.E. Journal by kind permission of the Society.

THE efficient use of insulation within a plastics mould has been long neglected due to the lack of a suitable heat or cold transfer barrier medium. Transite has been used a great many times but its use has been limited due to its compressibility and subsequent damage to vital mould parts after the mould has been subject to pressure. As a result, the importance of certain temperature control areas within a mould have been neglected and temperature control has been more or less dependent on one range for the mould as a whole.

This paper proposes the use of air-gaps or dead air spaces within a mould so as to insulate certain portions away from other temperature zones within a mould.

One important use of air-gap insulation has been in the sprue bushing. The hot plastics material passing through the sprue bushing that is installed in the water-cooled cavity plate permits a material chill to take place even before the plastic reaches the cavity proper. This chilling effect can be held to a minimum by the use of a series of concentric radial undercuts, or a large undercut relief area, to provide an air space between the sprue bushing and the cavity plate (Fig. 1). This is especially important where the sprue bushing is necessarily long and also in the case of restricted gate (pin-point) moulds where the fluid state of the plastics material is doubly important.

Contact Surfaces

Another important insulation control zone is in the contact surfaces between the mould plates and the press platens, especially in the case of thermosetting plastics (compression) moulding. This insulating can be accomplished by a series of longitudinal grooves, or cross-hatch grids, cut right into the mould contact surface so as to provide a certain amount of air-gap insulation between the hot mould plates and the press platens.

One of the most important uses of air-gap insulation is in the hot-runner mould. This high speed mould design requires critical temperature zone-control and this can only be accomplished by the use of air-gaps or dead air spaces. A typical hot-runner mould design is shown in Fig. 2.

One of the most efficient, though often most misunderstood mould designs, is the hot-runner mould. Material and labour shortages have brought added interest to this very efficient design which is now made practical through the use of air-gap insulation.

Too often in the past, the conventional three-plate mould or floating-plate mould as it is sometimes called, has been the basis of the design of the hot-runner mould. Actually the designs of these two moulds are separate and apart from each other. The three-plate or floating-plate mould depends on cycle removal of the gate system, whereas the hot-runner mould actually contains the runner system in a fluid state as a part of the injection machine nozzle.

Considerable difficulty has been encountered in the past with hot-runner moulds employing a split runner plate construction. Leakage was so great as to force the plates apart and the use of transite insulation within the mould was adding additional mechanical difficulties when the transite started to compress under moulding pressures.

The design of a typical hot-runner mould, shown in Fig. 2, is a modification of the original design shown in the August, 1946, issue of "DME News" (Detroit Mold Engineering Co.). It will be seen that the two-plate runner system is dispensed with, as is the use of transite insulation within the mould. Transite can be used as an insulation between the top clamping plate and the machine platen, as shown at A (Fig. 2); however, this is optional and even though the transite compresses, little harm can result at this point. If insulation is required at this surface, the use of a series of cross-hatch grid undercuts could be used to good advantage. B indicates the top clamping in which the solid hot-runner plate C is inserted. It is best to utilize a high grade of toughened steel for the hot-runner plate, such as 300 Brinell or better. This

* Detroit Mold Engineering Co., Chicago, Illinois.

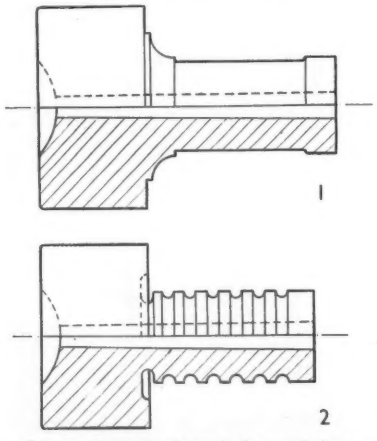


Fig. 1.—Sprue bushings before and after being cut for air-gap insulation.

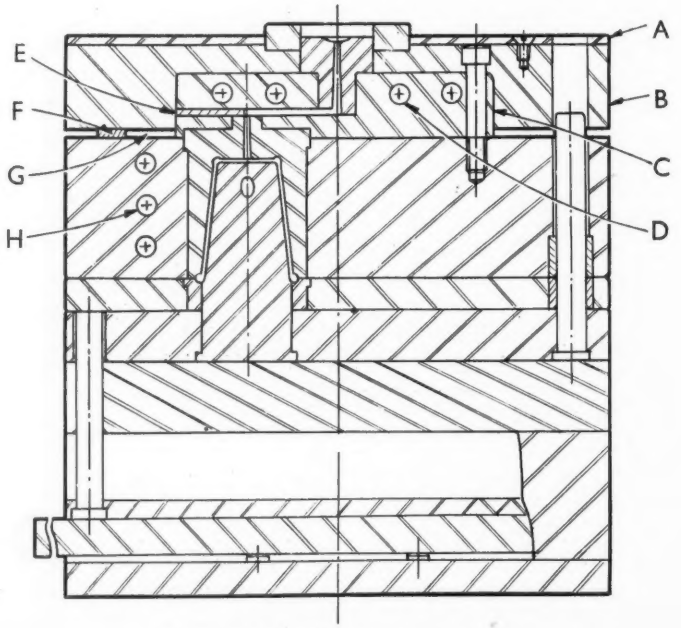


Fig. 2.—Details of typical hot-runner mould.

hot-runner insert plate is just large enough to accommodate the ends of the cavities and is to project from the top clamping plate about $\frac{1}{4}$ in. or $\frac{3}{8}$ in. to provide air-gap space around the hot-runner plate, and to utilize this air-gap as an insulation between the top clamping plate and the cavity plate. In order to provide adequate support points between the top clamping plate and the cavity plate, a series of small rest buttons are inserted in the air-gap area around the hot-runner plate insert F.

Hot-runner Plate

The hot-runner plate is self heated with adequate thermostatically controlled electric cartridge heaters to provide sufficient heat to maintain the plastics material in a fluid state while within the hot-runner plate. In order to secure additional insulation of the hot-runner plate from the top clamping plate, and the contact area adjacent to the cavity plate, a series of $\frac{1}{8}$ in. wide by $\frac{1}{8}$ in. deep with a $\frac{1}{8}$ in. land spacing undercuts are machined into all six surfaces of the hot-runner plate, even to the extent of a series of radial grooves machined into the top contact area of the individual cavity inserts. In the case of hot-runner moulds it is important to contain the relatively high temperatures of the hot-runner system away from the cool areas of the cavity plate. The use of air-gaps provides a non-compressible insulation barrier that accomplishes this. The runner system of the hot-runner plate is a series of reamed holes properly located with suitable plugs E at the ends to block off the runner away from the secondary sprue. This runner system is generally larger in diameter than the usual $\frac{1}{4}$ in. standard adopted in most restricted gate moulds (diameters from $\frac{5}{16}$ in. to $\frac{3}{8}$ in. are customary). In the case of the cavity insert, most of the time the secondary sprue can be made as a part of the cavity, thus eliminating the need for a separate sprue bushing at this point. The taper on the secondary sprue is the reverse of that used in the three-plate mould. In the case of hot-runner moulds, the secondary sprue taper is towards the cavity and the piece part is drawn from the mould with the small sprue attached, thus eliminating the danger of a "cold-slug" at this point. Adequate cooling in the cavity and core plates H should be provided as the temperature factor is very important in order to obtain the high-speed production of which this design is capable.

Each individual mould has its own characteristics and this paper cites only a few uses of air-gap insulation to help the mould designer.

British Radio Components Exhibition

WITH the continual stream of new uses of plastics materials, we are apt to forget that by far the largest field is still in the industry that first accepted them—for their properties of resisting the passage of electricity and their mouldability—and if one wished to see the part plastics plays in the electrical industry, the Radio and Electronic Component Manufacturers Federation's Exhibition, held at Grosvenor House, London, April 7-8, was as good as any.

With the exception of one stand which exhibited steatite and porcelain dielectrics, and another that showed metal structures, we believe there was none that did not exhibit components of one or more of the materials in the organic plastics field. Typical of many was a stand that displayed a multitudinous array of adaptors, connectors, fuse-holders, knobs of a hundred different types, mounting strips, switches, push-button volume controls, group-boards, and so on.

Among other exhibitors of special note to the industry was the polytetrafluorethylene winding wire at the stand of British Insulated Callender's Cables, Ltd. With it, coils can be wound capable of continuous operation at temperatures ranging from 75 degrees C. to 250 degrees C. The insulating film of P.T.F.E. is generally 1/1,000 in. thick.

The plastics manufacturing and moulding industry were fairly strongly represented by the following:—

BRITISH MOULDED PLASTICS, LTD. The exhibits included excellent examples of radio and television cabinets (a one-piece phenolic T/V console standing 36 ins. high was on view), a polystyrene T/V tube escutcheon, a large moulded cover for an electric water heater, motor-housings, nylon components and many exceptionally large accumulator cases.

THOMAS DE LA RUE AND CO., LTD. (PLASTICS DIVISION). Here were seen the two laminated forms "Traffolyte" and "Delaron," and p.v.c. extrusions for insulated sleevings. "Traffolyte" is widely employed for instructional panels on mechanical and electrical plant, since printing matter such as electrical and mechanical designs, etc., incorporated thereon as part of the laminate, cannot be erased or worn away during use. A coloured core also provides for the engraved form for making signs and instrument dials. Yet another form is the translucent engraving material, consisting of an opaque surface backed with a translucent material so that engraving the opaque surface permits back-lighting.

DURATUBE AND WIRE, LTD. This company exhibited a wide variety of their well-known extrusions which were probably the very earliest to appear in the country; they were also pioneers in the accurate control of extrusion to ensure concentricity of their p.v.c. covered wires.

HELLERMANN ELECTRIC, LTD. This company has long specialized in thermoplastics insulations, including sleeving and moulding. A description of some of their products as "dipped" mouldings is given elsewhere in this issue.

MICANITE AND INSULATORS CO., LTD. On view at this stand were a wide variety of this company's products in the field of mica-bonded dielectrics, glass fabric and paper laminates bonded with phenolics and silicone resins, aniline resin mouldings and p.v.c. products.

SUFLEX, LTD. This company, also among the early extruders of p.v.c. in all cross-sectional forms, showed a wide range of insulating sleeving and tubing in p.v.c. and covered, flexible wires.

THERMO-PLASTICS, LTD. On this stand special emphasis was laid on the most recent branch of work carried out—the fibre-glass polyester resin laminates for radome construction. Some examples of this, with an expanded rubber core, were also shown. Phenolic electrical mouldings, "Perspex" radio-cabinets escutcheons, and television lenses and masks were also on view. Of special interest also were the examples of "expanded" plastics for grilles—in this instance the expression refers to a form similar to expanded metal.

PLASTICS INSTITUTE

New Section for South Wales and Monmouthshire

During the past few years the plastics industry in South Wales and Monmouthshire has grown considerably, and as part of the Plastics Institute's drive to increase its membership, a meeting was held at the Park Hotel, Cardiff, on March 13 last, with a view to forming either a sub-section to the Western Section or a completely new Section. At this meeting 95 people were present, and as there was a unanimous vote in favour of the formation of a new Section of the Institute, a provisional committee was elected to make arrangements.

It has been decided to name the new Section the South Wales and Monmouthshire Section. The inaugural meeting is to be held at the Royal Hotel, Cardiff, on Wednesday, May 21, 1952, when a luncheon will precede the meeting.

The chairman of this new South Wales and Monmouthshire Section is Mr. E. M. Evans. The hon. secretary is Mr. E. H. Vokes, care of Imperial Chemical Industries, Ltd., National Provincial Bank Buildings, Bute Street, Docks, Cardiff.

New Productions

P.V.C. Gloves

The p.v.c. glove in normal supply for industrial use is generally in the form of a cotton liner or underglove with an exterior coating of p.v.c. Such gloves have to be made from fairly thick cotton to prevent permeation by the fluid p.v.c. during the dipping process. The skin of p.v.c. so applied to one side of the supporting fabric brings the total thickness usually to 1.5 mm., and this may not always be sufficient to provide complete protection under the particular conditions of use. In unfavourable circumstances a fairly light scratch might breach the p.v.c. and thus allow noxious chemical liquids to reach the cotton, to be there absorbed and in direct contact with the hands.

The Bias Binding Co., Ltd., Gorgie Road, Edinburgh 11, were of the opinion that a greater thickness of p.v.c. was really needed to give the fullest possible protection, and they decided to manufacture the stout unsupported p.v.c. glove we illustrate. The thickness of the p.v.c. in this glove is 2.5 mm., which is more than twice the thickness of the p.v.c. coating on a cotton-type glove, and with the natural abrasive resistant property of p.v.c. it should afford much longer service under severe conditions.

Table Lamp

The base, lid and filler cap of the "Aladdin" table lamp illustrated on this page are moulded from standard phenolic powder by W. W. Ball and Sons, Ltd., Billericay, Essex, for Aladdin Industries, Ltd. The base and the lid are screwed together and cemented with a suitable adhesive; subsequently, they are painted and stove-enamelled. Hitherto made in brass—now in short supply—the phenolic components have proved very satisfactory for the purpose served.

Flour Dredger

The flour dredger illustrated is moulded in blue and green wood-filled urea material. It is designed to pour or to sift according to requirements, and is especially useful when flour is used to thicken gravies, sauces, etc., as it ensures that no hard lumps are formed. It is also useful for the mixing of cakes, as the flour is sifted before use. It is more hygienic than the customary wire sieve as it can be easily washed after use. The mouldings are by Universal Metal Products Ltd., Langley Road, Pendleton, Salford, Lancs.

Lighting Reflectors

As an alternative to vitreous enamelled steel used in the construction of lighting fittings, Crompton Parkinson, Ltd., have been developing a reflector made in rigid p.v.c. An example of the application of this material to obtain a better product is the new AV.1114 vapourproof or dustproof fluorescent fitting. These fittings were previously available with either a vitreous enamelled or "Perspex" reflector—the new type has a white rigid p.v.c. reflector.

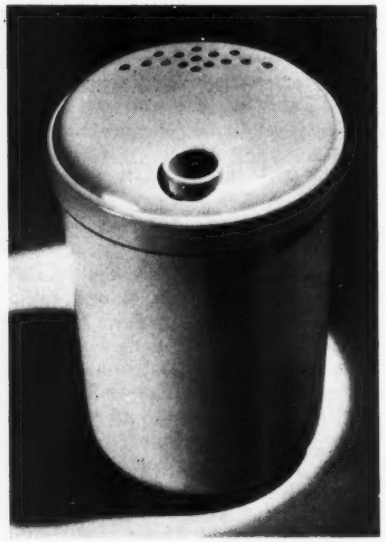
Although the original idea was to find a substitute for steel, investigations have proved that p.v.c. has decided advantages of weight, durability and resistance to corrosion when used for certain types of work. Temperature limitations preclude the general use of p.v.c. for all patterns of lighting fitting, but for the special Crompton vapourproof and dustproof designs its properties favour application, perhaps to the permanent exclusion of steel.

The reflector developed by Crompton Parkinson, Ltd., is of white opaque material, light in weight, very flexible and very difficult to break by straining or impact. It has a perfectly uniform colour, and a high reflection factor comparable to that of the highest quality vitreous enamels. It is resistant to moisture, oils, alkalines and acids, and will retain its colour indefinitely under normal conditions of usage. In general it is recommended as a superior alternative to the steel reflector type of fitting for all locations where the ambient temperature does not exceed 100 degrees F.

Inspection Lamp

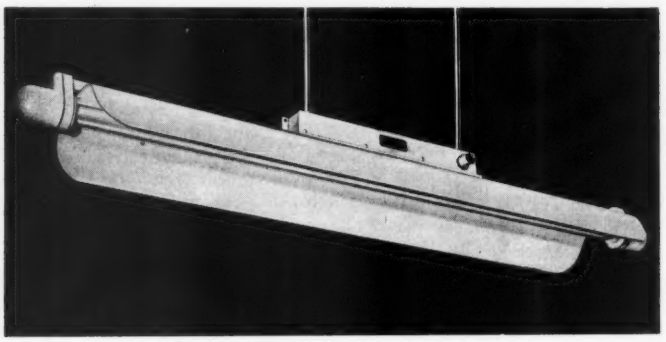
The "Gripper" industrial hand inspection lamp, manufactured by British Central Electrical Co., Ltd., 6, Rosebery Avenue, London, E.C.1, has been redesigned with a fully enclosed hood shaped from "Perspex," which replaces the glass casing formerly used.

"Aladdin" table lamp base (phenolic material).



Flour dredger (wood-filled urea).

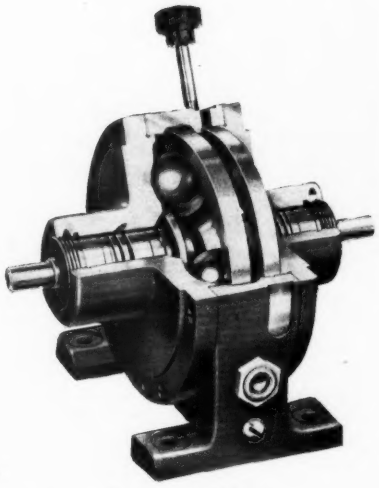
Gloves for industrial use (unsupported p.v.c.).



Lighting fitting with "Perspex" reflector.

PRODUCTION NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes



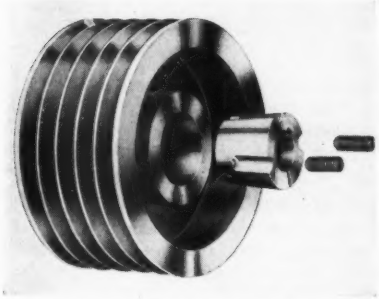
Kopp Speed Variator

SPEED VARIATOR.—The Kopp speed variator shown at this year's B.I.F. (Castle Bromwich, Stand D.257) by Allspeeds, Ltd., of Clayton-le-Moors, Accrington, Lancs, is the invention of a Swiss engineer. As supplied standard, it offers a combination of speeds within a ratio of 9 to 1; using an electric motor running at, say, 1,500 r.p.m., it will provide an infinitely variable speed variation of from 500 to 4,500 r.p.m. The standard models range from ¼ b.h.p. to 10 b.h.p.

The action of this device is as follows: When the input shaft of the variator revolves, it drives a cone through an automatic control clutch. This cone impinges upon a set of balls in a retaining ring causing the balls to rotate on an axis controlled by an iris. A similar cone transfers this energy to a shaft at the opposite end of the variator. Moving the axis of the balls by means of the iris changes the point of contact on the cone from the largest diameter of the balls to the smallest diameter respectively, bringing about the speed variation.

There are many advantages which the Kopp variator can claim. Power is transmitted continuously during speed regulation without loss. The range of speed regulation covers all normal requirements of industry and by the movement of the control lever, speed change is instantaneous. It will instantly respond to changes of speed under load, from maximum to minimum or vice versa, and will withstand such extremes as reversing instantly under full load which can be done with safety up to 300 times an hour.

The design is arranged in a neat and compact housing and is small enough to be built in as an integral part of a machine. Little or no attention is needed, excepting replacement of the oil after running for 1,000 hours. Electrical or mechanical remote control equipment can be attached without affecting the efficiency of the unit.



Fenner "Taper-lock" Pulley

"TAPER-LOCK" BUSHES AND PULLEYS.—At this year's B.I.F. (Castle Bromwich, Stand D.406), J. H. Fenner and Co., Ltd., Marfleet, Hull, are demonstrating the vice-like grip of their patented Taper-lock bushes and pulleys under continuous shock loading. They show how time can be saved by this up-to-date method of fixing pulleys to shafts without the use of a key.

RUMBLING PLANT.—The Kingsland Engineering Co., Ltd., 25-37 Hackney Road, London, E.2, have sent us a copy of their recently published literature relating to the mass-production treatment of moulded and fabricated plastics articles in rotating barrels. This literature is very informative; it deals with the different types and sizes of barrels which are available for rumbling and burnishing, the speed of rotation, drying equipment for the wet polished articles, the techniques of dry barrelling and wet barrelling, glossing and polishing materials.

GAUGE AND TOOL MAKERS' ASSOCIATION.—The Organizers of the 1952 Foire de Paris (International Trade Fair), which will be held at the Porte de Versailles, May 17 to June 2, have invited the Association to send a party of 50 directors of member-firms to Paris, May 22 to 25 inclusive. The party will be the guests of the Organizers of the Fair, who will pay all expenses.

APEX CONSTRUCTION, LTD., 15, Soho Square, London, W.1., have sent us a copy of their leaflet No. D52, describing vacuum tray driers. These driers are lighter and more compact than the older C.I. type. They are jacketed top and bottom to prevent condensation, and to make all shelves usable, the bottom jacket acts as a shelf. Stainless-steel-clad shelves and jackets are available with metal-sprayed body interiors, and there are five standard body sizes, into which standard shelves are fitted according to the working area and shelf spacing required. A laboratory drier, 18 ins. x 12 ins., fitted with two shelves, is available for experimental work.

PLASTICS IN GERMANY.—The German plastics industry will hold its first special fair for plastics in Düsseldorf, October 11 to 19. The fair is open to the producers of plastic materials, manufacturers of plastic articles, manufacturers of machines and tools for the industry, and producers of testing instruments and accessories. In addition to plastics, chemical fibres and the possibilities of their application will also be shown. The annual conference of the German Plastics Association will simultaneously be held in Düsseldorf. This conference is organized by the German Plastics Manufacturers' Association (Arbeitsgemeinschaft der Deutschen Kunststoff-Industrie), together with other technical and scientific organizations, such as the Plastics and Rubber Group of the Society of German Chemists, the Plastics Group of the Federation of German Engineers, the Special Plastics Group in the German Standards Institution and the Federation of German Physical Societies.

Foreign speakers will also discuss problems of the treatment and use of plastics in a wide number of industries.

INDUSTRIAL PRODUCTIVITY.—The Ministry of Education, with the aim of contributing to industrial productivity in this country, announces that 75 scholarships are to be awarded this year for the study of production technology and management in selected universities or technological institutes and in industrial undertakings in the United States. Successful candidates will be expected to leave for the U.S.A. early in September, 1952. The closing dates for applications are April 16 and 30 for the technological and management awards respectively. Full details may be obtained from the Ministry of Education (F.E. Division 1), Curzon Street, London, W.1.

E. K. COLE, LTD., have declared an interim dividend of 10 per cent., less income tax, payable April 1, 1952. This interim dividend is the same as that for last year, but is payable on the capital increased in September, 1951.

GEON 400x150, the latest resin developed by the British Geon Research and Development Laboratories, has now been put on the market and is noteworthy for its utility in two entirely different spheres: as a moulding compound, and in solid form for the production of surface coatings.

The resin as such can be processed in rigid form and is of special interest for the manufacture of gramophone records and other products by compression moulding. In addition, it may be extruded or moulded on injection moulding machines. The resin has the following properties:—

Specific gravity	...	1.37
Tensile strength p.s.i.		4,000-5,000
Elongation %	...	1-10
Softening point	...	60-65° C.

So far as its use for surface coatings is concerned, Bulletin G.12, just published by British Geon, Ltd., included the following table of solubilities for Geon 400x150, compared with those of Geon 205.

Solvents	Solubility (gm. polymer per 100 gm. solution)	
	Geon 205	Geon 400 x 150
Xylol	4.0	0.5
Acetone	16.2	23.2
MEK	11.0	28.7
MIBK	12.3	17.2
50/50 Acetone/xylol	21.3	25.8
50/50 MEK/xylol	15.9	26.4

VISIT TO I.C.I. PLASTICS DIVISION.—A party of 60 members of the London Section of the Plastics Institute visited the I.C.I. Plastics Division Laboratories on March 20. Mr. Maldwyn Jones, manager of the Technical Service department, welcomed the visitors. Special demonstrations were staged showing developments in lighting, problems in colouring plastics, equipment and methods of measuring the mechanical properties of thermoplastic materials, p.v.c. leathercloth coating and curing, brush filling with nylon bristles, injection moulding nylon, extruding alkathene film and lay-flat tube, forming "Perspex" and rigid p.v.c. sheet, and methods of making artificial dentures.

POLYTHENE BOTTLES.—Cascelloid, Ltd., 11-13, Southampton Row, London, W.C.1, have recently issued a descriptive leaflet on the use of polythene containers for the transport, distribution and storage of chemicals; it is appropriately titled "Cut transport costs with bottles that bounce." These polythene containers are suitable for a large range of chemicals, many of which are listed in the present leaflet, for example, hydrogen peroxide, 40 vols.; hydrochloric acid, 35 per cent.; nitric acid, 10 per cent.; sulphuric acid, 10 per cent. (50 per cent. strength up to 40 degrees C); phosphoric acid, 30 per cent., and formaldehyde. The standard sizes are 1, 2 and 5 gallons; non-standard sizes can be made up to 10 gallons. A 10-gallon glass carboy of the conventional form, with straw and crate, normally weighs 36 lb. when empty. Compared with this, two 5-gallon polythene containers, which do not require packing, weigh only 11 lb. On the weight factor, therefore, every gallon of liquid transported in polythene containers means 2½ lb. less deadweight than the same quantity in crated carboys—a saving of nearly 227 per cent. in container weight. As the polythene container is almost unbreakable, replacements are seldom required.

PLASTICS-INSULATED CABLE AND WIRE.—A showcard, recently made available to radio and electrical wholesalers, shows actual samples of some of the "Davu" plastics-insulated cables and wires made by J. Day and Co. (Derby Works) Ltd., Harrow Manor Way, Abbey Wood, London, S.E.2. They include single and twin lead conductors, air-spaced coaxial cables, and multiple conductor or coaxial cables. Copies of the showcard may be obtained on application to the company.

Private Account Imports of Moulding Powders — Board of Trade — Plastics Materials Section, February, 1952.

	Country of Origin	Licences issued Feb. 1952	Arrivals Feb. 1952
		Tons	Tons
Phenol and/or cresol formaldehyde ..	U.S.A.	—	0.35
Phenol and/or cresol formaldehyde ..	Canada	—	—
Phenol and/or cresol formaldehyde ..	Germany (W)	—	19.35
Phenol and/or cresol formaldehyde ..	France	—	—
Cellulose acetate butyrate	U.S.A.	4.85	22.1
Cellulose acetate butyrate ..	Germany (W)	—	—
Cellulose acetate ..	France	—	—
Polystyrene	U.S.A.	5	0.2
Polystyrene	Canada	—	—
Polystyrene	Germany (W)	—	—
	Totals ..	9.85	42

CATALIN LTD.—Net trading profit for year ended December 31, 1951, was £47,982, compared with £28,543 in 1950; of this profit £26,317 goes in taxation, leaving £21,665. Profits carried forward from last year amounted to £13,805, to which add £309 (a provision for tax not now required), giving total carry forward of £14,114 and thus providing £35,779 available for distribution. The directors recommend a dividend of 5 per cent. be paid and that £20,000 be transferred to reserve, making a total reserve of £80,000; this leaves a balance of £10,516 to be carried forward to 1952.

LACRINOID PRODUCTS LTD.—According to the chairman's statement accompanying the report of the directors for the year ended December 31, 1951, the turnover for the year was the highest in the history of the Company, and trading profits rose from £34,726 to £55,231. To compensate shareholders for the two lean years, during which reorganization was taking place, the directors recommend that, in addition to the total dividend for the year of 10 per cent., a bonus of 5 per cent. should also be paid.

MOULDED PRODUCTS LTD. announced that the following appointments have been made to their administrative staff. Mr. A. E. Curtis will become commercial manager, Mr. W. D. Wilkinson is promoted production manager, and Mr. W. J. Fluckiger will become sales manager. In addition, Mr. J. H. Ireland will rejoin the company and act as assistant to the works director.

P.A. PERMUTA (PLASTICS), LTD., are not showing at this year's B.I.F., but are holding their own exhibition in Suites 306 and 417, at the Piccadilly Hotel, London. Articles on show will include toys, household goods, fancy goods, industrial mouldings, etc. The exhibition will be open from 10 a.m. to 10 p.m. daily, except Sunday, May 5 to 16, inclusive.

MICHAEL S. STEVENS, dealer in plastics scrap, announces a change of address to Keswick Works, Keswick Road, Putney, S.W.15 (hitherto Cambridge Park Mews, Twickenham, Middx). The new telephone number is Vandyke 3345.

ALL-PLASTIC SKELETONS.—An illustrated 4-page leaflet by Educational and Scientific Plastics, Ltd., London Road, Croydon, treats of the care and accuracy which go towards the making of anatomical models by this company, who appear to be the only concern in the world making all-plastic skeletons.

PLASTICS PRODUCTIVITY IN U.S.A.—The team chosen on a national basis by a selection committee representing the British Plastics Federation, the Engineering and Allied Employers' National Federation and the Trades Union Congress, to visit the United States under the auspices of the Anglo-American Council on Productivity, returned to England on April 3, after a six-weeks' tour of American plants.

In a statement made on arrival at Southampton, Mr. A. C. Sparshott, the leader of the team, said that developments in injection moulding machines created particular interest. Design in that field seemed to be very active. The team was able to study some of the very big machines being built in the United States, and saw one of them in operation.

The Plastics Industry Golfing Society held their Annual Dinner-Dance at the Savoy Hotel, London, on March 28. Our photograph shows one of the amusing incidents when the Chairman, Mr. C. C. Last, presented Mrs. Jack Urban with a silver hot-water jug.

On the thermosetting side, some interesting modifications of the normal compression presses were seen. The team, however, did not see in this field any machines that could stand up to comparison with the latest British presses; but two samples were seen of banks of automatic compression moulding presses.

It was with some pride that the team noted the use of British extrusion machines. It was felt that there was a useful field here for the exchange of machines of this type for some American finishing equipment and raw material of types not available in the United Kingdom.

The team feels that while there are no sensational features to report as a result of its visit, the sum total of its observations will be of considerable use to the British plastics moulding industry. It hopes to present its full report shortly.

The team of sixteen representatives, drawn from managerial, technical and workshop levels, was received in the United States with every courtesy and saw many plants.

OBITUARY.—We regret to announce the death of Mr. Thomas Wood Fazakerley, F.P.I., M.I.P.E., who was fatally injured in a car accident on March 28, at the age of 43. The whole of Mr. Fazakerley's commercial life was associated with the rubber and plastics industries. After early experience with Charles Mackintosh and Co., Ltd., the Dunlop Rubber Co., Ltd., and the Firestone Tyre and Rubber Co., Ltd., he joined P. B. Cow and Co., Ltd., as secretary in 1933, later becoming general manager and a director. When he left P. B. Cow and Co. in 1949 he formed Educational and Scientific Plastics, Ltd., of Croydon, Surrey, and pioneered the production of plastics replicas of the bones of the human body, as well as complete human frames, for use in medical instructional centres.

PLASTICS INSTITUTE, N.W. SECTION, announce that their annual general meeting will be held at the Grand Hotel, Aytoun Street, Manchester 1, on May 23, at 6.15 p.m. and will be followed by a hot pot supper at 7.0 for 7.15 p.m.

Machines for the Industry.

H.P.M. 32-oz. Injection-moulding Machine

This machine is manufactured in England under licence by John Shaw and Sons, (Salford) Ltd.; Wickmans Ltd., of Coventry are sole selling agents for the U.K.

THE H.P.M. 32-oz. plastics injection-moulding machine is a new design introduced less than two years ago. It features all-hydraulic control, with all-hydraulic components (pumps, valves and controls) mounted in the open for easy accessibility. This unit is fast becoming popular for those bigger moulding jobs which are beyond the scope of the smaller machines, and is especially designed for deep-section parts.

Model 600-H-32 is a horizontal-acting four-rod-type machine, with hydraulic mould clamp. It is completely self-contained and powered by H.P.M. hydraulic pumps, valves and controls. Material feeding and heating are automatic.

The hydraulic mould clamp consists of a double-acting ram (fitted with metallic piston rings) working in a smooth-bored steel cylinder. The main ram is equipped with a small internal booster ram. The booster ram closes the clamp platen to within a fractional part of an inch of the total clamp stroke. At this predetermined position, hydraulic fluid under pressure is shifted to the large ram area. This arrangement permits practically all of the clamp travel to be accomplished by the use of the fast-closing booster ram. Forward mould clamp ram travel is limited by a hydraulic by-pass arrangement, eliminating the need of stop collars on the tie rods.

On the return stroke, the mould clamp is adjustable to any position within the limits of the clamp ram travel, permitting the shortest possible mould clamp movement. Clamp opening starts at slow speed to separate the mould, shifts to high speed, and then automatically slows down before contacting ejector bars. The clamp platen is fitted with precision-bored bronze bushings for guiding on the strain rods; these bushings are designed for efficient lubrication.

The hydraulic injection unit consists of a double-acting ram (fitted with metallic piston rings) working in a smooth-bored steel cylinder. The cylinder and feed chamber are mounted as a unit on ways, and this unit is moved hydraulically. When the clamp closes, pressure on the nozzle-sealing cylinders moves the heating-chamber nozzle against the mould. This entire injection unit may be retracted hydraulically, so that the heating chamber will clear the stationary die head. In this position the heating chamber can be purged or removed. Clamp and injection ram pressures are adjustable through a convenient hand-wheel. The injection ram speed is also adjustable.

The injection chamber is securely mounted to a steel casting, which is part of the injection unit. The chamber is mounted with wedge clamps to permit quick and easy removal. All internal surfaces of the injection chamber coming in contact with the plastic material are chrome-plated, making it suitable for all types of thermoplastic moulding materials which do not affect chrome plate. The injection plunger is of ground and polished Nitralloy, and is water-cooled.

The injection chamber is provided with a three-zone heating system using B.T.H. "Pyrobar" heaters with Ether-Wheelco indicating temperature controls. The heating system is rated at 33 kW.

The material hopper is made of stainless steel, and is designed with a sloping bottom and smooth-finished interior which permits easy cleaning. It is provided with a window, so that the operator can readily check quantity of material present. The material is fed down the hopper by gravity, and the amount entering the chamber is measured. The feeding mechanism is provided with an automatic compensating means for feeding the correct amount of material in the heating chamber at all times. "Double-shot" injection can be used at the option of the operator.

The machine is arranged for both manual and semi-automatic control. For manual control, the switches and push-buttons are furnished for "start" and "stop" of the motor; heat "on" and "off"; manual and semi-automatic cycle control; clamp control; injection control and emergency reverse button. Closing and opening of the clamp and injection stroke are controlled by switches which operate the main working valves. With manual operation it is possible to utilize the clamp and injection units independently. An emergency "reverse" button returns the clamp to open position from any point. The die set-up switch allows

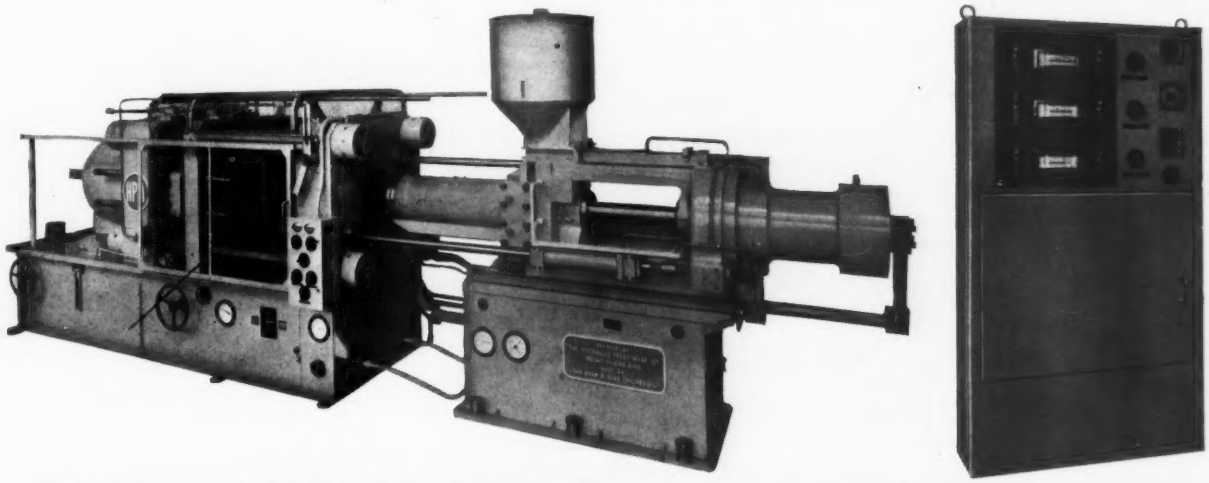
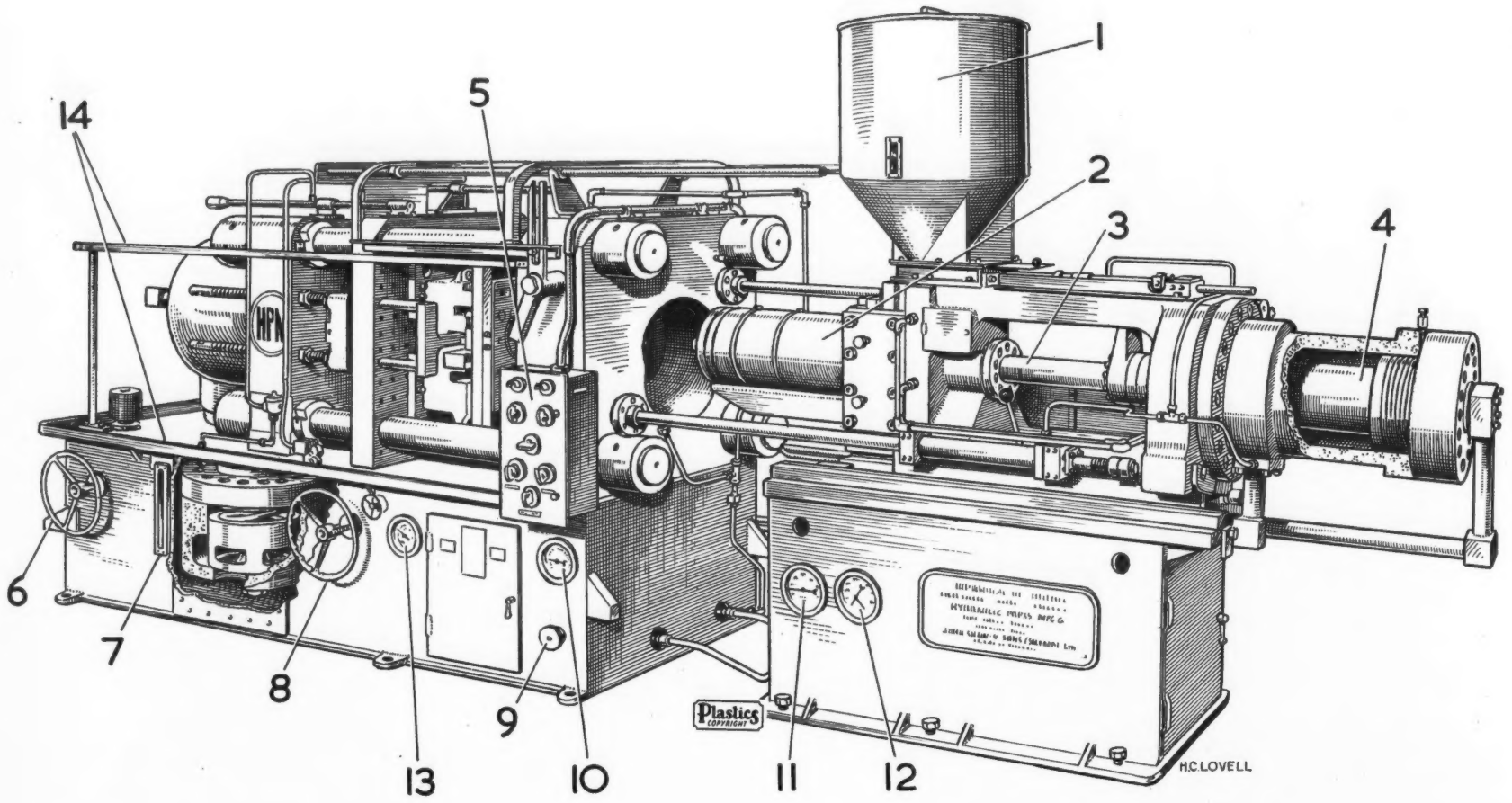


Fig. 1.—General view of H.P.M. 32-oz. injection-moulding machine, seen from the front; (right) Ether-Wheelco temperature-control cabinet.



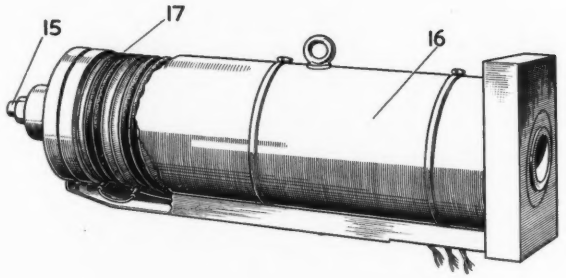


Fig. 2.—H.P.M. ½32-oz. injection moulding machine. (Inset) Details of heating arrangements for cylinder.

1. Hopper.
2. Heating chamber.
3. Injection plunger.
4. Injection piston.
5. Operator's control panel.
6. Pump control.
7. Oil level.
8. Pump control.
9. Tonnage control.
10. Clamp ram pressure.
11. Injection ram pressure.
12. Line pressure.
13. Oil temperature.
14. Guard frame with Perspex panel runs on these rails.
15. Nozzle.
16. Heating chamber.
17. B.T.H. " Pyrobar " heaters.

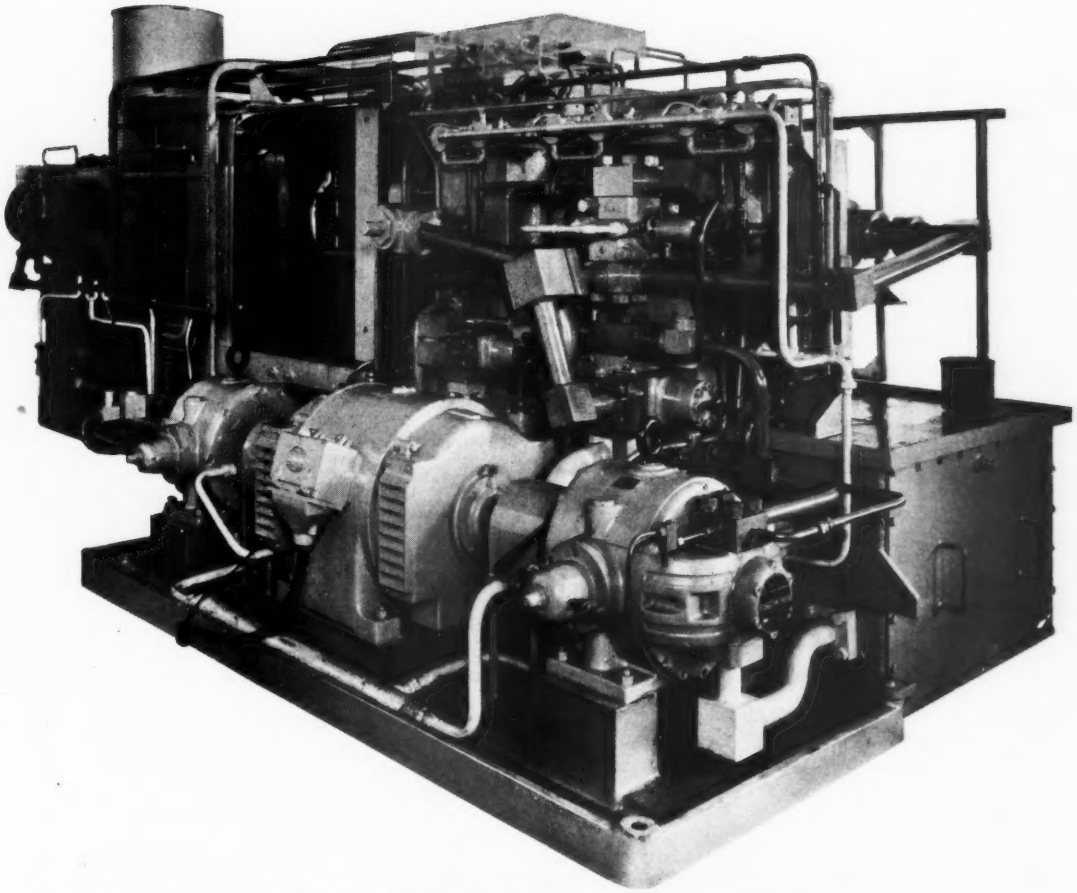


Fig. 3.—Rear view of H.P.M. 32-oz. injection moulding machine, showing operating valves, pumps and motor.

slow advance on hand or semi-automatic functioning to protect the dies.

For semi-automatic control, the main operating valves are pilot-operated hydraulic brakes. Three "Microflex" timers are provided for controlling the clamp and injection actions. Centre and side knock-out rods are provided for operating knock-out plate in the mould.

The machine is equipped with a safety gate which prevents the closing of the clamp while the gate is in the open position. This is accomplished through mechanical linkage with the clamp-operating valve. Opening of the safety gate will interrupt the cycle and will return the mould clamp to open position. The floor space occupied by the machine is 20 ft. 6 ins. by 3 ft. 8 ins., overall height being 8 ft. 2 ins.; the power unit takes 7 ft. 7 ins. by 3 ft. 6 ins. of floor space.

General Data

(1) Clamp platen—actuated by one double-acting main ram with one internal booster ram.

Pressure capacity (U.S. tons), 600; max. pressure for separating mould (U.S. tons), 58; main ram diameter (piston × rod), 25 ins. × 23¾ ins.; booster ram diameter, 5¾ ins.; max. mould space, 43 ins. × 25¾ ins.; clearance between tie rods, 26 ins. × 26 ins.; max. daylight opening, 48 ins.; min. mould thickness, 24 ins.; ram travel (maximum), 24 ins.; clamp ram speeds (inches per minute): Closing, 530; opening (slow), 145; opening (fast), 290; ejecting, 145; slow closing (die set-up), 14.

(2) Ejector—actuated by return movement of mould clamp ram. Clamp opening stroke provided for slow break-open of moulds, fast return, and slow ejection.

Max. pressure capacity (U.S. tons), 58.

(3) Injection plunger—actuated by one double-acting ram.

Pressure capacity (U.S. tons), 142; ram diameter (piston × rod), 11½ ins. × 7⅛ ins.; pressure on material (p.s.i.), 20,000; injection plunger (diameter), 4¼ ins.; injection plunger (stroke), 15 ins.; injection plunger speeds (inches per minute), fast advance 157, injection speed (constant full length of injection stroke) 67; fast return, 116; rate of injection (cubic inches per minute), 950.

(4) Nozzle seal and injection-unit cylinders—actuated by two double-acting rams.

Ram diameter (piston × rod), 3 ins. × 2 ins.; max. pressure (U.S. tons), 10.

(5) Operating system—H.P.M. hydropower dual circuit, with H.P.M. radial pumps, hydraulic pressure generator serving both clamp platen and injection ram.

Pressure (p.s.i), 2,450 to 2,740; speed (r.p.m.), 1,200; displacement (gallons per minute), 30.

Training Grants, 1952

The Trustees of the Plastics Industry Education Fund invite applications from young men or women engaged in the plastics industry, for a limited number of Training Grants of £100 per annum for one year to cover all expenses including tuition fees, which may be increased at the discretion of the Committee in special cases, the onus being upon the candidate to find a suitable college willing to admit him/her.

These grants are for full-time courses of one year's duration, for technical training covering Associateship of the Plastics Institute, Intermediate Special or intensive Final B.Sc. courses in pure and applied mathematics, physics and chemistry, or an intensive course for a Diploma or National Certificate in chemistry, electrical or mechanical engineering.

Applications for Training Grants must be submitted in writing to the Managing Secretary, The Plastics Institute, Adelphi, Adam Street, London, W.C.2, by June 1, 1952.

Technique and Design of Pin-point Gating with Injection Moulds—I

By W. M. HALLIDAY

The practice of using drastically restricted gate openings adopted with the new pin-point gating technique, is extremely novel and indeed revolutionary when judged against orthodox gating methods. The underlying principles of this modern technique, and the objectives sought are discussed in this article. Important design factors, and points of departure from conventional gating practice, and the advantages claimed for pin-point gating are also described.

WITH injection type moulds applied for the successful and economical reproduction of moulded articles in thermoplastics, the design of the entire material-feeding system will be of paramount importance. Indeed, injection moulding has been described as largely a matter of efficient feeding and gating to ensure best flow conditions. This definition is, of course, an overstatement, in that it excludes several other important factors; nevertheless, it does emphasize the crucial part played by the feeding system. It is undoubtedly true in actual practice that the greatest number of weaknesses, or failures occurring with a mould, and/or many irregularities encountered with finished mouldings, originate in poor feeding and gating provisions in the mould.

Runner/Gate Feed System

The feeding system of any injection mould embraces, first, the sprue channel —a tapered hole in the mould along which the material charge is led from the machine injecting nozzle to bring it to the parting joint surfaces. Next the charge is fed from this point along runner channels, usually situated upon the parting joint surfaces, and branching out in suitable manner to lead to the various cavity formations contained therein. Lastly, the charge passes through the gate opening formed at the end of each runner channel (it being in fact a constriction of the latter) to flow into the mould cavity. The gate opening therefore impinges directly into the side wall of the cavity.

By this means a supply system is provided in the mould along which an *adequate supply* of plastics material may flow to give proper fill to all the cavity formations. The feeding system has to be of such a character as will ensure such supply being transmitted to cavities along the *shortest* and most *direct route*, and in the *quickest* time, and thus with the minimum loss of *velocity* and *temperature*.

The italicized terms indicate the prime requisites to be observed in respect of the feeding system. The runner channels and gate openings must therefore, be of sufficient capacity, correct cross-sectional shape, and direction to permit these objects to be achieved.

Sometimes a runner system may be designed where the channels are deliberately of restricted capacity, the purpose of which is to limit the volume of runner waste material. Despite the fact such runner waste can usually be recovered in economical manner for later re-moulding, and the small additional savings obtained therefrom, such savings on material may easily be nullified by the greater number of scrap mouldings.

Runner channels of an unduly restricted capacity may mean a serious loss of velocity or heat of the plastics charge passed through the system on its way to the cavity. Premature chilling of the outer layers or skin of the charge may occur whilst in the runner channels. Furthermore, there will always be some degree of frictional drag between the viscous charge and the relatively cold walls of the mould runner channels, etc. This factor exerts a considerable influence upon the whole design of sprue, runner channels gates, and cavity lay-out.

The number and location of cavities relative to the sprue channel will, of course, determine the length and direction of travel adoptable with the main runner channels. With multi-impression moulds the runner/gate system may therefore be exceedingly complex in lay-out, since preferred design practice is to provide each cavity with a separate and distinct gate opening, with the latter fed from its own separate runner channel, or individual branch thereof.

The size, form, cross-sectional shape, location and direction followed by runner channels and gates, together with their relationship to sprue and cavities, are matters of the utmost importance if efficient feeding is to be achieved.

A great deal of care and consideration has thus to be exercised in the elucidation of these critical requirements and relationships. This should be performed preferably at the outset of any particular moulding project when planning the basic features to be embodied in the component and the chief design forms to be employed in the mould.

The characteristics of the feeding system as briefly outlined above, will determine in a most practical form the successful working of the mould; the quality and appearance values obtained on the moulded article; its soundness and physical strength, and the general economy attainable with actual production operations.

Influence and Effects of Feed System

A few of the more direct ways in which the feeding system may affect mould operation or properties of the moulding may be briefly mentioned.

The "flow" of the viscous plastics charge entering the mould cavity will be very greatly influenced by the shape, length, size and surface finish of runner channels and gate openings. The character of the "flow" induced or affected by the runner/gate system, i.e., its velocity and temperature, will in turn have a profound effect upon the degree of homogenity and wall strength of the moulded article. It may largely condition the quality of "weld" occurring between successive layers of hot material built up in the mould cavity. On the other hand, the ability to admit a sufficient volume of plastics material at the required speed to ensure proper filling out of the cavity will also be governed by the capacity, form, and lay-out of the runner/gate channels.

Poor "flow" arising from bad location, or incorrect size of runners or gates may also lead to excessive over-heating of the mould at localized spots due to rapid radiation of heat generated by the increased friction caused by the charge having to pass along a constricted channel, or one having rough surface finish.

Overheating of the plastics charge or some portion of same may also arise from the additional frictional resistance offered to its flow by inadequate runner channels.

Increased injection pressures may sometimes be necessary to force the plastics change through runners of an unduly small capacity so that full "flow" will be maintained, and proper welding of layers ensured within the cavity area.

The surface finish of the moulded article may also suffer due to turbulence induced in the flowing charge passing through unsuitably designed runners and gates. This will chiefly occur when the gates are located in unsatisfactory manner with respect to cavity walls, by cores interjecting into the cavity area, or other stationary portions of the mould lying across the main flow taken by the material.

Considerable variations may occur in mould temperature during working, because of the sluggish flow, or excessive friction, etc.

The successful operation of the mould and its regular smooth running during any production sequence may be

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The fertile brain of Firg Uson got to work. He produced bricks with a *new property*—HIGH IMPACT RESISTANCE, which were unbreakable and therefore invaluable for important documents. Unfortunately, when Babylon fell, Firg Uson's property of high impact resistance was lost at the Lost Property Office.

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adversely affected because of the onset of some or all of the foregoing undesirable features.

In order to make the best selection of feeding system to avoid any of the features just mentioned, it may frequently be necessary to alter the component shape or to modify some feature so that greater facility may be offered the mould designer. Where such freedom to adapt the component is allowed, the mould designer will frequently be able to locate runners and gates in the best possible relationship to sprue and cavity walls.

This will particularly be the case with articles of intricate shape and form, especially if they have to be extensively cored, and when the mould cores will lie across the normal flow. Multiple impression moulds, too, will usually embrace additional difficulty for the designer when determining the most suitable points of feed, the best lay-out for runner channels, and how parts have to be gated generally so that a *balanced* "*flow*" of material will be obtained throughout all critical portions of the mould.

Thus any latitude which can be permitted the mould designer in respect of modifications to component design may often show economies which prove definitely worth while when the actual moulding stage is reached.

Determination of Runner and Gate Sizes

Whilst the capacity of the runner channel, and gate opening too, must bear some relationship to the volume of material needed to fill the mould cavity, this relationship cannot, as a rule, be reliably determined purely by theoretical calculations based on the volumetric capacity of the cavity and the velocity of the charge.

To some extent this requirement has to be determined by "cut and try" methods on the completed mould, carried out during the normal preliminary proving tests, which have to be conducted on every injection mould before starting production.

Though the size and capacity of runner and gate channels cannot be ascertained with close precision at the outset before the mould is completed, their location and relationship with sprue and cavity, can and should be fixed at this early stage. This will be important when planning a mould design, for the following reasons:—

Runners should generally follow the most direct line to the cavity, and be devoid of all abrupt changes in direction. Such channels should also not be situated too close to other working portions of the mould. The runner channels should be laid out in the most balanced fashion relative to the critical working area of the mould, i.e., that portion containing cavities. This will be necessary because very often the runner channels may be employed for regulating or equalizing the thermal balance of the mould.

Indeed, mould designers often employ "dummy runner channels" having no gate termination and which do not feed into a cavity. Such channels may be disposed alongside a long cavity formation so that the hot plastics material injected therein at each shot will distribute a certain proportion of its heat in counter-balance to that dissipated into the mould by the proper runner feed channel at the opposite side of the large cavity.

Gates should be situated on those portions of the cavity where flow will be least interrupted by stationary cores, projections, or will be least deflected by undercuts, and openings which intersect the cavity area. They should be located too, at those points where the resultant flash and removal-scar will be least visible and preferably on some unprominent surface of the moulding. The gate must also be situated in the most accessible position for machining in the parting joint surface of the mould, as well as to permit the gate-flash to be trimmed off the moulding in the simplest fashion.

The selection of satisfactory locations for both runners and gates can usually be reached at a very early stage in mould design by an intelligent consideration of all the factors, with special reference to those of component shape; flowing features of the charge; the presence of cores, etc., liable to impede the flow, and the quality of surface finish desired on the gate portions of the moulded article.

Since every injection mould has to be gated in a provisional manner in respect of size and capacity, but not location, it is customary with designers to employ gate channels machined shallow or narrow in width, to allow opportunities for later enlargement or modification according to needs revealed by the usual proving tests on the mould.

From the purely machining and cost angles, alteration of gate opening sizes, and even enlargement of runner channels, will be comparatively easy and inexpensive. It would not be so simple, however, to alter the disposition of runner or gate channels to allow the cavity to be fed at a different point from that originally planned. Such a requirement would entail machining a completely new set of runner and gate channels, etc., and the stopping off of the discarded set. This latter operation would usually be effected by means of blanking pads let into deep recesses machined to remove the old runners, etc.

Introduction of such drastic alterations whilst quite feasible and sometimes necessary, should be avoided by devoting the maximum consideration to the best locations in the first place. Alterations of such an extensive character would not only incur high additional costs, but may seriously diminish the quality of both mould and moulded product, as well as becoming the source of numerous operating troubles.

For example, use of such blanking pads to stop up unsuitable gate openings will almost always result in some line-flash occurring on the sides of the component because such pads will have to pass fully into cavity walls, and their jointing surfaces will lie below the parting plane of the mould thus appearing as a well perceptible mark on some side of the finished moulding. Continued working of the tool may, in course of time, lead to some slight separation of the jointing surfaces between pad and recess in the mould block, leaving interstices into which material would be injected at each shot. The presence of such interstices would thus increase the tendency towards thick flashing on the part. The component, too, would tend increasingly to "hang" by such flash to the walls of the cavity during ejection, so entailing additional operating difficulties.

These are some of the chief considerations to be borne in mind during the early stages of mould design when planning efficient runner/gate feeding provisions in the mould. The selection of the most satisfactory feed, especially in regard to gate sizes and forms and locations so as to induce best flowing conditions in the cavity, will largely depend upon the understanding possessed by the designer of the "flow patterns" and feeding requirements of the particular thermoplastics material being used.

Development of Pin-point Gating Techniques

For the more successful moulding of the newer thermoplastics, i.e., acetate butyrate, polystyrene and certain of the methacrylates, the use of conventional gate forms and sizes, as based upon "flow patterns" assumed to occur with the more well known and older materials, were found to give unsatisfactory results in practice.

During recent years considerable research was conducted into the moulding of such new materials in endeavours to elicit the most suitable "flow patterns" and other critical moulding requirements. The outcome of such research has been the development of a new gating technique, which is known as "pin - point gating," sometimes referred to as "pin-hole gating." These terms are derived from the fact that the material charge is fed through a gate opening of minute size in comparison with those employed with conventional forms.

This technique has been developed by the American plastics industry, which up to the present has employed these newer thermoplastics very much more

extensively than our own plastics industry.

Numerous practical advantages and economies are claimed, chief of which is that of superior basic "flow." The objective of the technique being to ensure that the hottest and most freely flowing centre portion of the material charge passing through the runner channel, and gate opening in particular, will be directed into the mould cavity in the most natural way. This it is claimed greatly reduces the ill-effects of premature chilling of the outer layers of the charge, sluggish flow, loss of velocity, and inferior welding of the successive layers introduced into the cavity.

Further advantages deemed connected with the technique are: such a minute gate may be more readily located in the mould to give the best feeding of the cavity; resultant flash on the side of the moulded article will be of almost microscopic scale, thus permitting the designer to locate gate openings in the tool with far greater facility and with much less risk of detracting from the smooth unbroken surface finish on the exterior portions of the moulded article.

The flash resulting at the gate will also be so tiny and of such weak proportions as to be very easily severed by the normal ejection of the moulding from its cavity, leaving practically no visible scar. Trimming operations for the removal of runner/gate flash will thus generally be unnecessary.

The pin-point gate is so designed that the flowing charge passing that point is in effect a tube, consisting of cooled and slow-moving outer layers bearing against the mould surfaces, and a hot, free-flowing inner core layer. This latter core can pass speedily into the cavity at the maximum velocity to give rapid and complete fill. The outer cooler skin layers of the charge laying against the walls of the runner and gate channels form an insulation protecting the hot inner core against further heat losses to the mould.

For this reason, it is claimed, a more rapid and effective fill of the cavity is obtained since only the hottest material is utilized, and therefore unduly high injecting pressures, normally required with conventional gates to impact sluggish flowing material, will not be necessary.

From this it must not be understood that pin-point gating is generally applicable for all thermoplastics, and for any shape of moulding. With certain plastics materials, and particular sectional shapes of moulding, objections have been encountered when moulding same from moulds with pin-point gates. Much knowledge remains to be elicited from the underlying difficulties associated with such applications, before a more universal adoption of the technique will be possible.

The principle of material feeding, the flow patterns induced, and the several important design characteristics with "pin point gating" cannot, however, be properly understood without some consideration and knowledge of the comparable action and features of the conventional gate. Therefore, to give this essential background for the better comprehension of the objects and technique of this new method, a brief account follows of the inherent features and requirements of the orthodox gate.

Characteristics of Orthodox Gate Designs

With the conventional gate, irrespective of its cross-sectional shape and size, the basic "flow pattern" assumed to take place may be briefly described as follows:—

The hot plastics charge enters the cavity from the gate opening in the form of a continuous ribbon or jet, whose cross - sectional shape will closely resemble that of the gate opening.

The charge in its passage from the sprue orifice throughout the runner system will tend to flow outwards from the centre to fill the runner channels, and with the outer layers lying closely in contact with the walls of the runners and gate.

The outer skin layers of the charge in contact with the cool surfaces of the mould runner channels, etc., will tend to lose heat rapidly by radiation, and thus will flow more slowly than the hottest centre core portions.

The ribbon-like charge entering the cavity will traverse same with either a spiral or undulatory movement according to the particular cross-sectional shape of the gate opening.

If the cavity being fed is of considerable depth, but of relatively short length from the gate, the initial velocity imparted to the charge may be sufficient for the ribbon to flow completely to the opposite side wall of the short cavity.

The charge will thereafter build up against the cavity wall in a series of closely packed folds, which will quickly weld together into a single compact plastics mass, given the requisite plasticizing temperature and pressure.

This filling action, originating at the far end of the cavity will cause the continually welding mass to spread backwards to approach the gate entry until the entire cavity is filled. The last portion to be filled out will be that located closest to the gate.

The pressure imposed on the ribbon charge must be sufficient to overcome all friction occurring between the various layers of the material having different temperature and flow, and to press the charge built up in the cavity into a homogeneous mass.

If the gate opening is of rectangular or trapezoidal cross-sectional shape, the ribbon-like layers (of the same shape) will move into the cavity with a certain undulatory movement. If the gate opening is circular in cross-section, the ribbon layers will flow with a spiral movement.

Where the mould cavity is very narrow, but of considerable length from the gate cavity, the injected hot plastics ribbon feed may not travel completely up to the remote endwall of the cavity under the initial velocity.

The flow may, in fact, stop short of that cavity wall, and the advanced portions of the charge will rest upon the floor of the cavity. This contact will produce an immediate chilling effect on the material leading to a loss of velocity and arrested or very sluggish flow. The partial setting of the chilled material may be counteracted to some extent by the entry of fresh hot layers lying at the centre of the ribbon.

These hotter and more freely flowing portions will thus build up behind the sluggish cool portions and welding thereto. This constantly increasing welded mass will thus be pressed along the cavity by the pressure of incoming material until the cavity is completely filled out. This building-up filling action will be promoted by reason of the low thermal conductivity of the thermoplastics material, and the ability of the hotter inner core layers to push through the cooler and more sluggish outer skin layers of the plasticized mass. It will be appreciated, of course, that such cavity-filling action occurs with great rapidity.

This description is confined to the simplest form of cavity lay-out into which the ribbon-like charge has to be injected, i.e., one free from all intersecting cores, or substantial projections.

Should the cavity be fitted with large size stationary cores, or other projections lying across the line of main flow, as often happens in practice, the form of gate opening may have to be considerably modified to give a balanced flow. For example, if the cavity has a large core disposed axially with the line of material flow, gating at one side of the cavity may give poor results, since the main flow will proceed along that side of the core. In such circumstances it would be preferable to employ a ring gate opening encircling the core, so that flow will be obtained in balanced fashion around all sides of the core.

Problems of this character will be more fully discussed at a later stage in this series, when describing the various conventional gate forms employed.

(To be continued)

BX PLASTICS, LTD.—Three recently published leaflets of this company relate to "Bexoid" cellulose acetate moulding powder, moulding powder for toys, and BX p.v.c. rigid extrusions. The latter are exceptionally strong but can be bent without elaborate equipment; are easily sawn, drilled or nailed; are available in a wide standard range of profiles in bright and attractive colours.

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2s. 8d. each (including postage).

B.P. 659,766. Manufacture of plates in particular for embossing, printing or the like. Ciba, Ltd. (U.S.A.).

An imprinted aluminium foil is joined to a rigid backing plate by an alkyl resin incorporated in a fibre layer.

B.P. 659,771. Pearl polymerization of unsaturated organic compounds. R. N. Haward, J. Elly, W. P. Hohenstein, Petrocarbon, Ltd.

B.P. 659,788. Method for the production of spinnerets. R. W. Martyn, I.C.I., Ltd.

A hollow box-like structure is made from a number of rigid frames with layers of spaced parallel wires. The structure is filled with a liquid convertible into a solid block of synthetic resin, then cut into discs at right angles to the wires which are etched away leaving parallel holes.

B.P. 659,847. Emulsion polymerization of styrene. To: British Thomson-Houston Co., Ltd. (U.S.A.).

The crystal-clear polystyrene produced is especially useful as dielectric material, also for decorative electrical light fixtures.

B.P. 659,958. Cross-linking compositions comprising a solid polymer of ethylene. To: E. I. du Pont de Nemours and Co. (U.S.A.).

The product is suitable for wire coating by extrusion, for making into filaments, rods, tubes or shaped electrical or other articles.

B.P. 660,002. Glazing and embossing of textile fabrics. L. B. R. H. Roberts, C. D. Weston, I.C.I., Ltd.

The fabric, preferably cotton, is impregnated with a solution leading to the formation of a formaldehyde resin and subjected to hot friction calendering.

B.P. 660,011. Preparation of thermoplastic resins from fluorene. R. J. S. Jennings, A. F. Williams. To: C.D. Patents, Ltd.

The resins are adapted for electrical insulation where high heat resistance is desired and for moulded articles of high softening point.

B.P. 660,102. Closure for bottles, collapsible tubes and like containers. S. W. Jackson.

B.P. 660,117. Projection screens. J. S. Jacobson (Netherlands).

The screen of glass or plastics (transparent or translucent) has one surface at least subdivided by irregular projections or depressions forming a certain angle with the virtual surface of the screen.

B.P. 660,121. Moulded tooth or a plurality of teeth and method of making the same. E. B. Kelly (U.S.A.).

The teeth are moulded from plastics (acrylic resin) in several steps so as to give to tooth tip and face another colouring than to its base and further to apply a harder film over the tooth surface.

B.P. 660,165, 660,166 and 660,167. Copolymeric vinylidene chloride compositions. A. Abbey. Comm. from: Dow Chemical Co.

B.P. 660,235. Production of organosilicic resins. To: Soc. des Usines Chimiques Rhône-Poulenc (France).

B.P. 660,242. Metal or plastic window frames. R. E. Bates, Crittall-Luxfer Aluminium Windows, Ltd.

The frames are formed from extruded sections arranged for receiving locking members for connecting two frames or frame and building.

B.P. 660,249. Extrusion machine. A. B. F. G. Richardson, E. Tunnicliff, I. K. Fisher, British Insulated Callender's Cables, Ltd.

For making rubber or thermoplastic tubing, a detachable head is clamped to the barrel of the machine so as to be easily removed. The head can be angularly adjusted about the axis of the barrel.

B.P. 660,252. Adhesives. B. Polovtseff, G. A. Collie. To: Airscrew Co. and Jicwood Ltd.

Cold-setting adhesive based on synthetic resin of resorcinol-formaldehyde type is cured by para-formaldehyde. Acetone is added just prior to the application of the adhesive. Intended for bonding in particular aluminium to wood.

B.P. 660,254. Manufacture of reinforced ebonite or like hard rubber conduits. A. E. Norman, Nordac Ltd.

B.P. 660,279. Production of thermoplastic materials having grained or patterned surfaces. Dunlop Rubber Co. Ltd., R. Cantor, T. E. H. Gray.

A plurality of positive prints is prepared from a photograph of a surface with natural (leather) or random markings. The prints are arranged in a mosaic, the joints retouched and a negative produced from this new integral area of the size of the roller surface to which it is applied. The engraved (etched) roller then produces a leather-like pattern on a polyvinyl chloride sheet.

B.P. 660,291. Cock capable of being produced in two parts by a moulding operation. F. F. Aguda.

The cock of simple tubular form with a mouth-piece screwed to one end is specially designed for being made of plastics.

B.P. 660,302. Protective wrapper for filamentary packages. To: American Viscose Corp. (U.S.A.).

Paper is coated with a flexible film of regenerated cellulose.

B.P. 660,356. Coating compositions for use in the production of mineral-coated paper. G. E. Niles. To: Monsanto Chemical Co. (U.S.A.).

A slurry is prepared of mineral pigment in 4 to 30 per cent. of an aqueous dispersion of a styrene-alkyl acrylate copolymer.

B.P. 660,358. Method of producing rigid and light materials having a closed cellular structure. To: L'Equipment Menager et Industriel "E.M.I." (France).

In an organic thermoplastic polymer is incorporated a gas blowing agent activated by heat and one or more aryl isocyanates. The material is heated and then subjected to water vapour.

B.P. 660,359. Heat seaming apparatus. Communications Patents Ltd., R. E. Bazin.

Thermoplastic sheets are welded, or non-thermoplastic sheets seamed using a thermo-sensitive adhesive, in a high frequency field in which one electrode is a thin metal sheet acting as movable carrier for the work. The sheet is supported on one of the press members.

B.P. 660,361. Container sealing composition. To: Dewey and Almy Chemical Co. (U.S.A.).

To a finely divided resin suspended in a liquid is added a reinforcing filler and a congelation agent.

B.P. 660,363. Heat-sealable packaging. To: Wingfoot Corp.

Coatings made from a styrene-diene resin applied to glassine form a transparent, heat-sealable, non-marring package for foods, drugs, chemicals, tobacco.

B.P. 660,365. Waterproof watchcases. T. M. Wachter. (U.S.A.).

The entire casing is made of transparent plastic, front, back, sides and lower end moulded as a unit. After insertion of the movement, the upper end is closed by another piece of plastic and sealed.

B.P. 660,366. Catalysts for accelerating the cure of aminoplasts. A. H. Stevens. Comm. from: Monsanto Chemical Co.

B.P. 660,377. Process for the production of polymers of unsaturated ethers and compositions containing such polymers. To: N. V. de Bataafsche Petroleum Maatschappij (U.S.A.).

B.P. 660,398. Process for obtaining laminated products. To: E. I. Du Pont de Nemours and Co.

Surfaces of polytetrafluoroethylene (chemically resistant coating) are joined to metal, glass, plastics, natural and synthetic resins, etc.

B.P. 660,407. Incorporation of volatile medicaments, compounded perfumes and other volatile substances in synthetic plastics. W. Engel.

B.P. 660,473. Electrical capacitors. F. C. Stephan, D. P. Downey, Wego Condenser Co. Ltd.

The enclosures for the active part including electrodes consists wholly or mainly of a synthetic resin which sets hard at a temperature not higher than 100 deg. (Registered trade mark "Marco").

B.P. 660,501. Apparatus for centrifrugally forming canopies and the like, for aircraft, from thermoplastic sheet material. To: Goodyear Aircraft Corp. (U.S.A.).

The hot sheet inserted in a jig is formed by a bar thrown outwardly by centrifugal force against the inside of the work material,

B.P. 660,661. Manufacture of moulding compositions. R. Neiger, L. Weiss. To: Hornflowa Ltd.

Finely divided keratin and cellulose are mixed separately with portions of a solution of amino-plastic material. The two doughs are then mixed, dried and ground to powder.

B.P. 660,663. Protective Clothing. To: A. Calderbank.

Parts of a porous garment are rendered impervious by cold application of a thermoplastic resin (polyvinyl chloride) in combination with a solvent evaporating at normal temperature.

B.P. 660,761. Copolymers of vinyl halides. To: N. V. de Bataafsche Petroleum Maatschappij (U.S.A.).

Vinyl chloride is copolymerized with a halogenated propene under certain conditions. The new material shows greater resistance to age brittleness and has better milling properties.

B.P. 660,940. Method of copolymerizing vinylidene chloride and vinyl chloride. A. Abbey. Comm. from: Dow Chemical Co.

B.P. 661,002. Manufacture of cellular thermoplastic products. A. Abbey. Comm. from: Dow Chemical Co.

Polystyrene and a normally gaseous agent dissolved by the polymer at below 130 deg. C. are subjected to superatmospheric pressure at a certain temperature, forming a gel of the polymer. The agent is vaporized on release of pressure.

B.P. 661,005. Containers. To: Hughes Brushes, Ltd. (U.S.A.).

Toothbrush receptacles made from cellulose derivatives or other plastics with ventilation holes sealed until used.

B.P. 661,018. Adhesive compositions. To: Bakelite Corp. (U.S.A.).

A mixture of polyethylene and a halogenated aromatic hydrocarbon heated to between 100 and 200 degrees C. for two hours is suitable for securing polyethylene to itself or to metal, glass, wood, ceramics.

B.P. 661,025. Floor coverings. T: Dunlop Rubber Co., Ltd. (Australia).

Rubber or rubber-like materials such as polymers or co-polymers of vinyl chloride are stiffened by thin metal strips united during moulding and curing.

B.P. 661,028. Optical projection screens. B. E. Luboshez. To: Kodak, Ltd. (U.S.A.).

Two superimposed groups of parallel cylindrical lenses at an angle to each other are formed by rollers on a transparent screen of glass, plastic or other rigid material.

B.P. 661,095. Holder or compact for articles such as toilet articles. E. A. Kollontay (Austria).

An inner carrier with compartments, walls and ledges is moulded from plastic and set in a cylindrical outer casing of transparent plastic material.

B.P. 661,144. Dental crowns and methods of securing them. L. Egger (Austria).

A hollow tooth crown of polymerized plastic material is provided on its inside with longitudinal ribs which fade out towards the neck of the crown. The crown is filled with polymerizable plastic material and fitted to the prepared (by grinding) natural tooth.

B.P. 661,166. Method of moulding plastic materials. A. H. Stevens. Comm. from: Polymers Corp.

A charge of a synthetic linear polyamide (nylon) is introduced into a cylindrical container, and while in molten condition set under pressure by a piston and forced into the preheated mould.

B.P. 661,171. Decorative sheet-like articles and processes and apparatus for making same. M. A. Chavannes (U.S.A.).

A continuous sheet is formed on an embossed continuous and continuously advanced carrier by applying a first film forming substance of one colour to the high points of the embossed carrier, then a second (main) film forming substance (copolymer) of vinyl acetate and vinyl chloride) of a different colour over the first film layer. The stripped-off dry substance has an embossed two-toned surface (reptile skin effect).

B.P. 661,276. Number plates, signs, and the like. K. J. Garle.

Digits of polythene or polystyrene with integrally moulded studs are fixed to a perforated metal backing plate by toothed washers pressed over the rearwardly projecting ends of the studs.

B.P. 661,291. Interpolymers. To: United States Rubber Co. (U.S.A.).

A new class of material for casting and moulding or, dissolved, for coating, laminating, impregnating is obtained by heating together a monomeric di-2-propenyl itaconate, a monomeric styrene and a monomeric 2-propenyl chloride in certain proportions.

B.P. 661,292. Copolymers. To: United States Rubber Co. (U.S.A.).

The new class of soluble, unsaturated polymeric materials suitable for casting and moulding or, dissolved, for coating, laminating, impregnating is produced by heating a monomeric 2-propenyl chloride to 25-120 degrees C., using the chloride in the proportion of 0.1 to 10 mols per mol of the itaconate.

B.P. 661,328. Apparatus for tracing objects, designs and the like to reduced or enlarged scale. W. M. J. Sexton.

A " Perspex " sheet is slidable in an open frame on two rods.

B.P. 661,354. Number plates, signs and the like. K. J. Garle.

Moulded plastic digits (polystyrene or polythene) are formed with rearwardly projecting studs of a certain shape.

B.P. 661,362. Process for the production of new vulcanizable and elastic Thioplasts. Régie Nationale des Usines Renault (France).

B.P. 661,367. Polyvinyl chloride plasticizers. M. F. Carroll, W. G. Wearmouth, A. Boake, Roberts and Co., Ltd.

Into the polyvinyl chloride is incorporated an ester of an aliphatic or aromatic polybasic carboxylic acid with certain alcohols.

B.P. 661,380. Plasticized polyvinyl resin compositions. H. R. Gamrath. To: Monsanto Chemical Co. (U.S.A.).

The novel compositions contain certain monoalkyl phenyl cresyl phosphate esters and a polyvinyl chloride resin.

B.P. 661,503. Polymers of 2-vinyl-dibenzothiophene. To: British Thomson-Houston Co., Ltd. (U.S.A.).

B.P. 661,588. Process for treating mixtures comprising polyvinyl chloride and industrial products obtained thereby. K. Elias, A. Dawant Soc. à.r.l.

A quantity of alpha-monochloronaphthalene is incorporated. Products obtained may be films, coatings, laminates or solid bodies.

B.P. 661,619. Ternary interpolymers of vinylidene chloride, alpha-methyl styrene and acrylonitrile. A. Abbey. Comm. from: Dow Chemical Co.

B.P. 661,624. Nail coating article and method. B. Bogoslowsky.

Thin sheets of pigmented plastics (vinyl-vinylidene chloride, nylon), are mounted on the plastic pages of a booklet.

B.P. 661,726. Combs. J. S. Walker, Fraser and Glass, Ltd.

A hair comb has a longitudinal groove at the back with a number of holes leading to the teeth. An insert is cemented into the groove so that a longitudinal hole is formed open at one end to be closed by a plug to which a perfumed rod is attached extending into the closed hole.

B.P. 661,731. High-frequency dielectric heating method and apparatus for bonding thermoplastic material. To: Radio Corp. of America (U.S.A.).

The voltage is first below the break-down value, then raised to a maximum value above the break-down voltage.

B.P. 661,761. Process for producing uniformly coloured thermoplastic resinous polymerized vinyl aromatic compounds. A. Abbey. Comm. from: Dow Chemical Co.

A molten mixture is formed of a colouring material and polystyrene, then mixed with a larger stream of uncoloured resin, formed into a uniformly coloured mass and extruded.

B.P. 661,803, 661,804. Vinylidene chloride/vinyl chloride copolymer compositions for making shrinkable, translucent films. To: Dow Chemical Co.

A combination of modifiers lower the flow viscosity of the copolymer for easy extrusion.

B.P. 661,385. Coated film suitable for use as packaging material. To: Wingfoot Corp. (U.S.A.).

Rubber hydrochloride film is coated with a copolymer of vinylidene chloride (80 parts) and acrylonitrile (20 parts).

B.P. 661,844. Method and machine for producing moulding granules. To: Dow Chemical Co.

Corrugated sheets of brittle polystyrene may be cut without formations of larger granules and excessive formation of fines in a machine having a rotary cutter when certain conditions are maintained (brittleness, thickness, angle of knife, etc.).

B.P. 661,845. Production of polymethacrylates. To: Les Usines de Melle (France).

A methyl ester is polymerized in the presence of 2-methyltetrahydrofurane peroxide as catalyst. The pure methyl methacrylate obtained may be used for making optical glasses.

B.P. 661,868. Method of manufacture of reservoirs for reservoir writing instruments. P. O. Rosin, H. R. Fehling. To: Cia Uruguaya de Formento Industrial S.A.

A tube of thermoplastic synthetic resin (cellulose aceto-butyrate) is expanded in a die by admitting steam under pressure into the tube, which is closed at the other end.

B.P. 661,881. A process for improving the properties of polymers. To: N. V. de Bataafsche Petroleum Maatschappij (Netherlands).

B.P. 661,886. A process for the disintegration of conglomerates of polymer particles. To: N. V. de Bataafsche Petroleum Maatschappij (Netherlands).

B.P. 661,899. Arrangement for illuminating a small object to be viewed. A. J. Calder L. F. Wood. To: Siemens Brothers and Co., Ltd.

The " light piping " property of polymethyl methacrylate is utilized for transmitting light through a polished bevelled surface.

B.P. 661,902. Copolymers. To: United States Rubber Co. (U.S.A.).

Moulding powders are obtained by heating a tri-2-propenyl aconitate and a 2-propenyl chloride in certain proportions.

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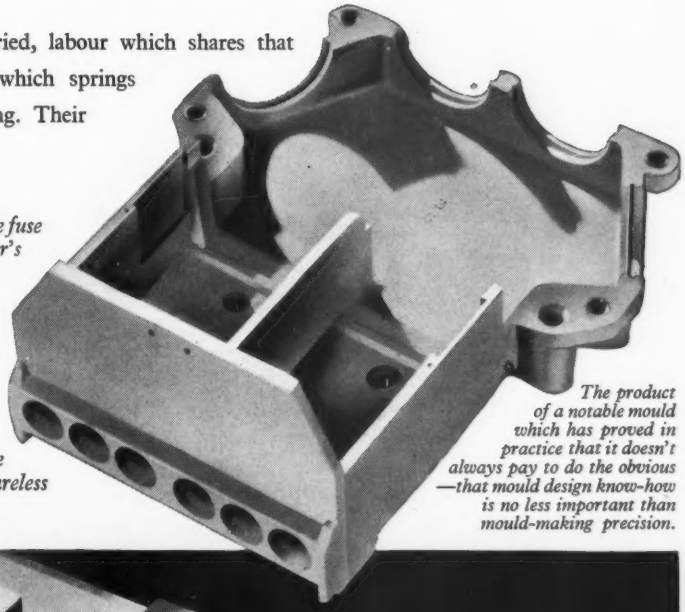

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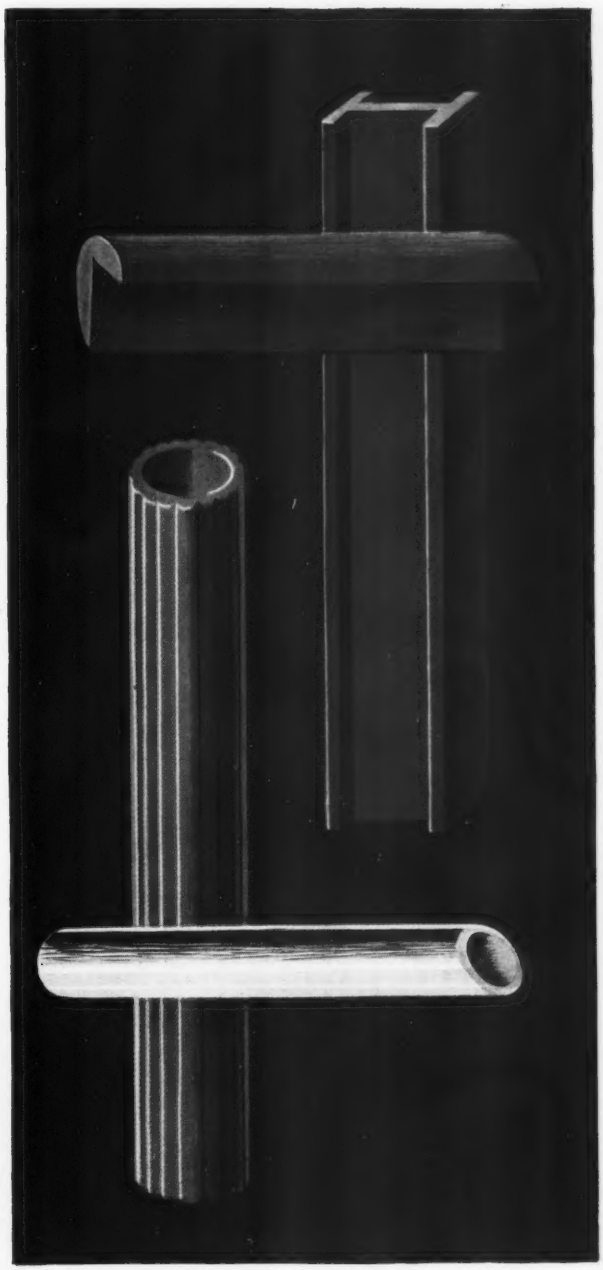

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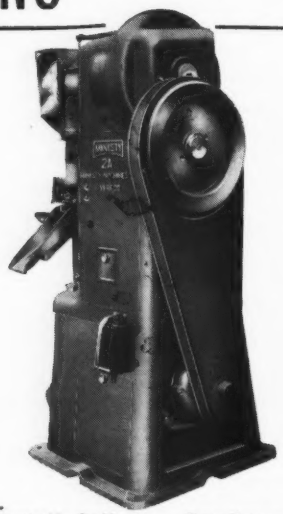

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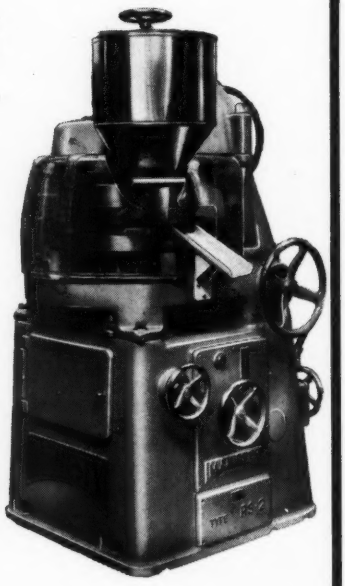

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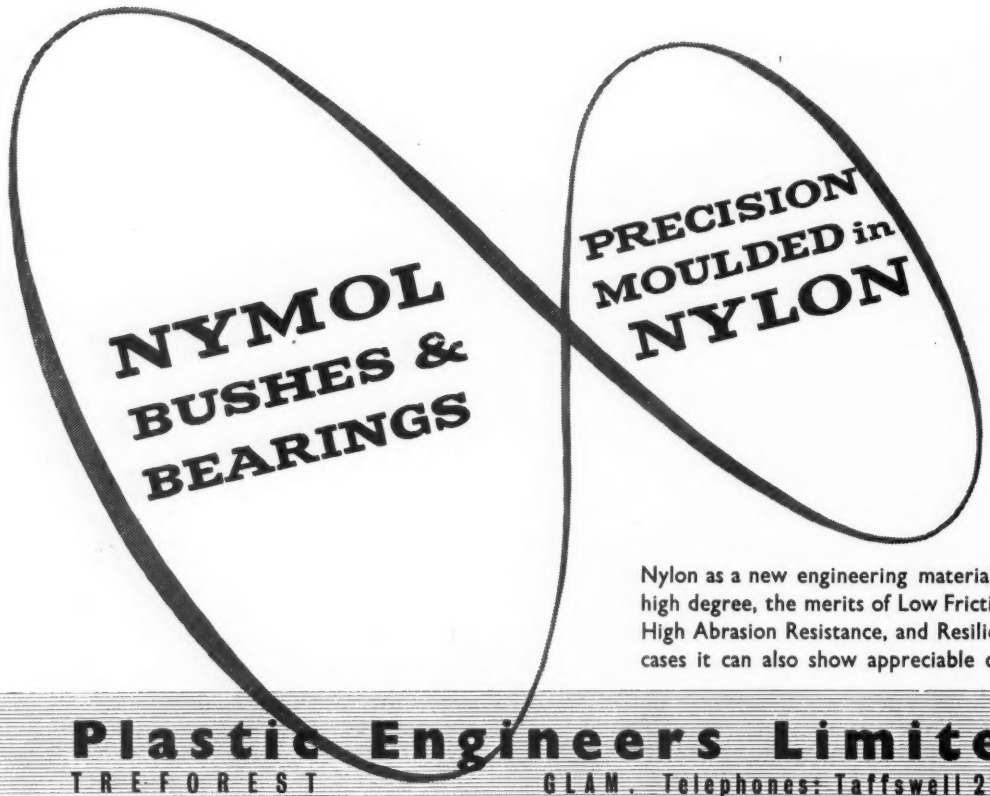

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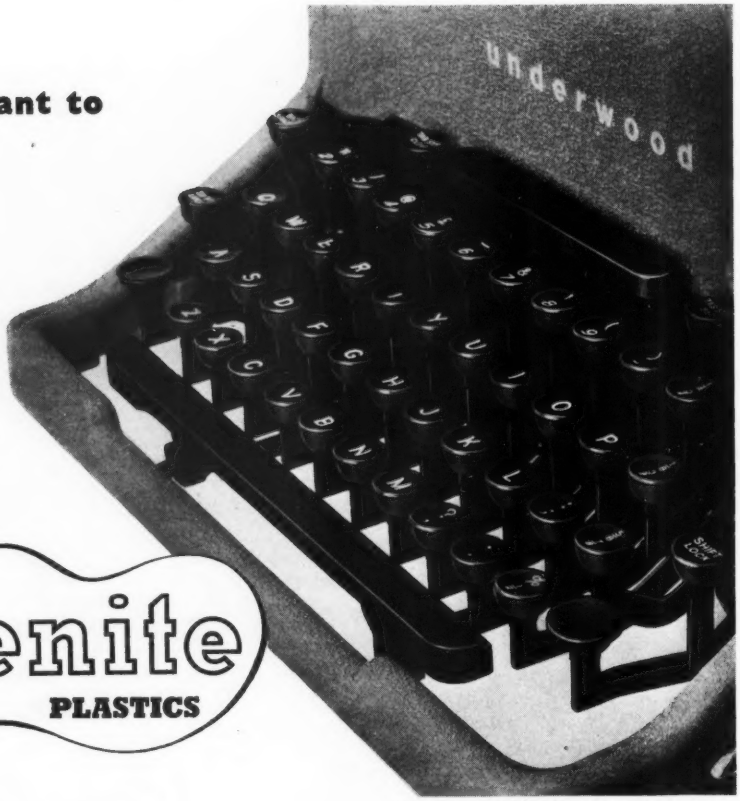

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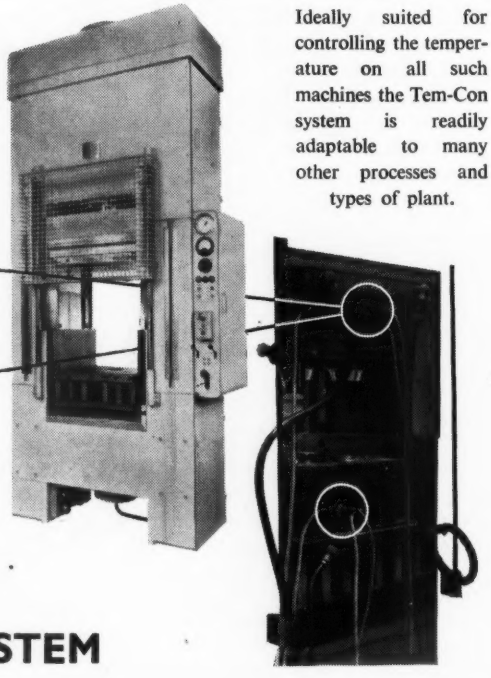

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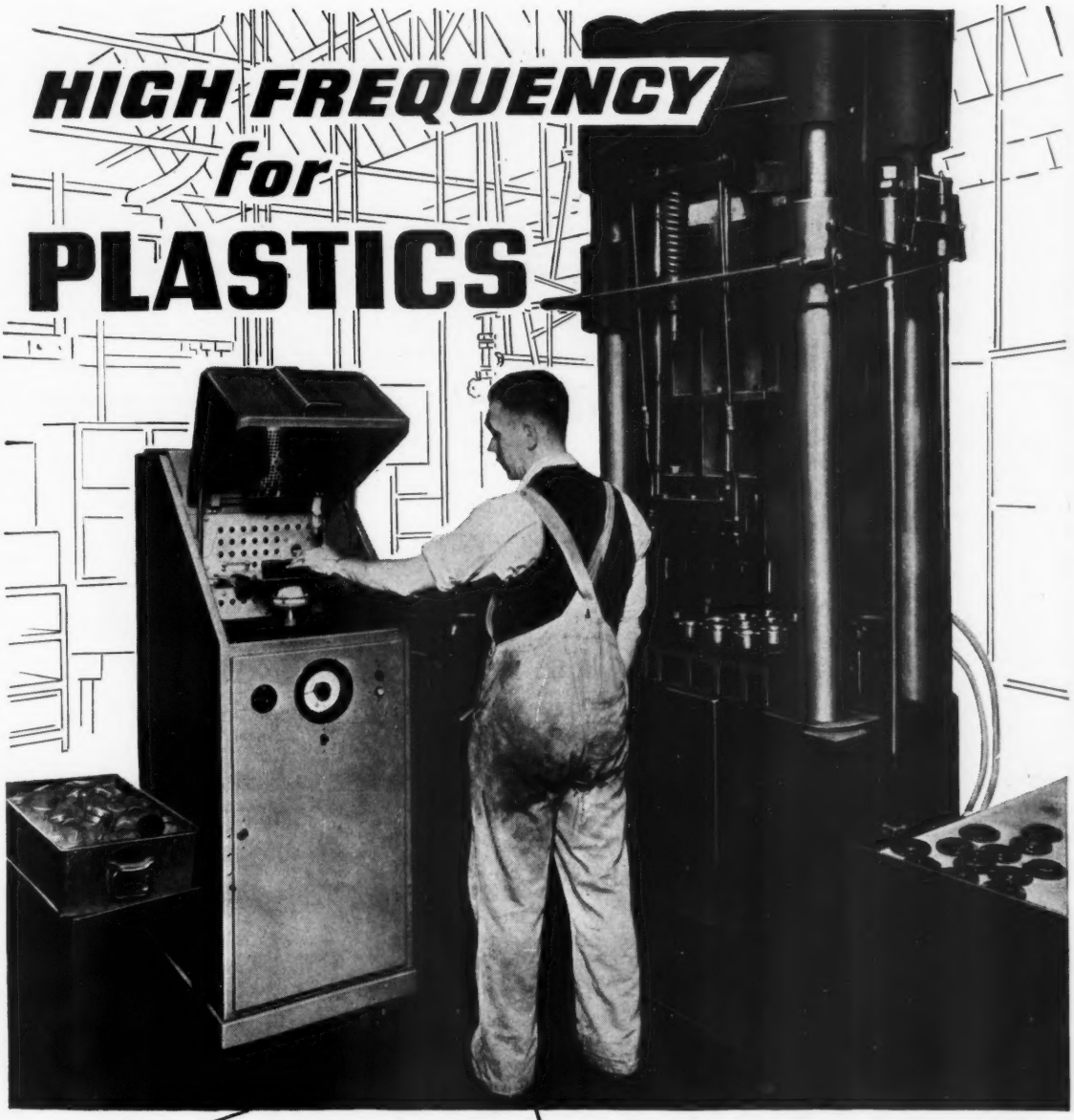

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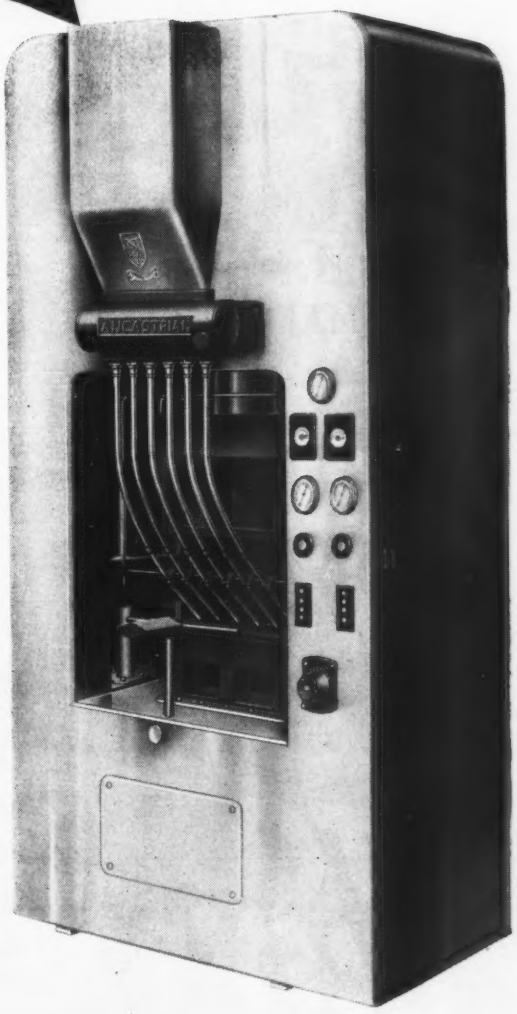

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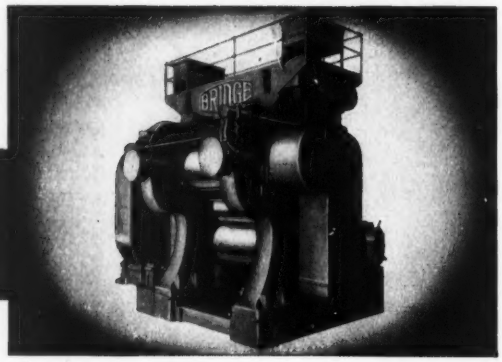

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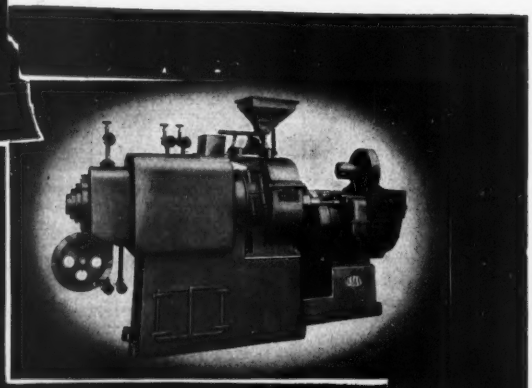

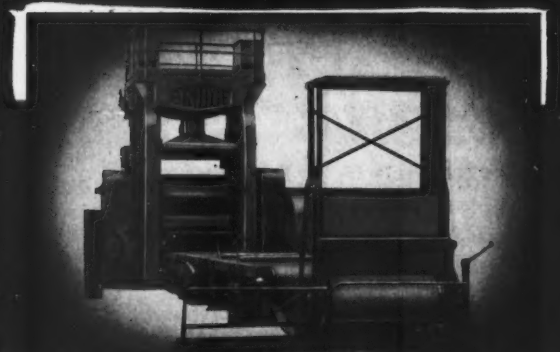

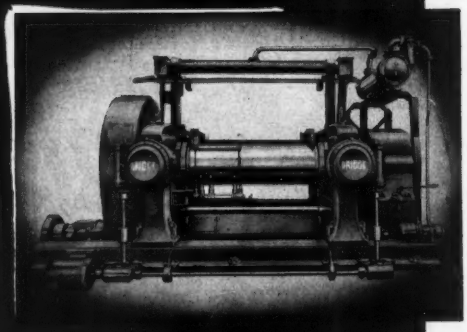

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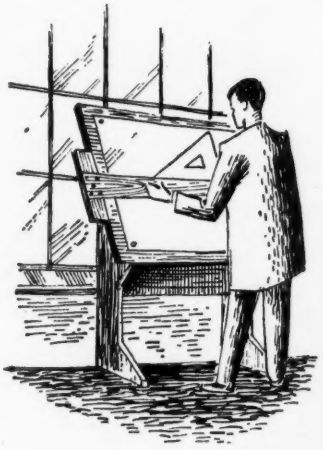

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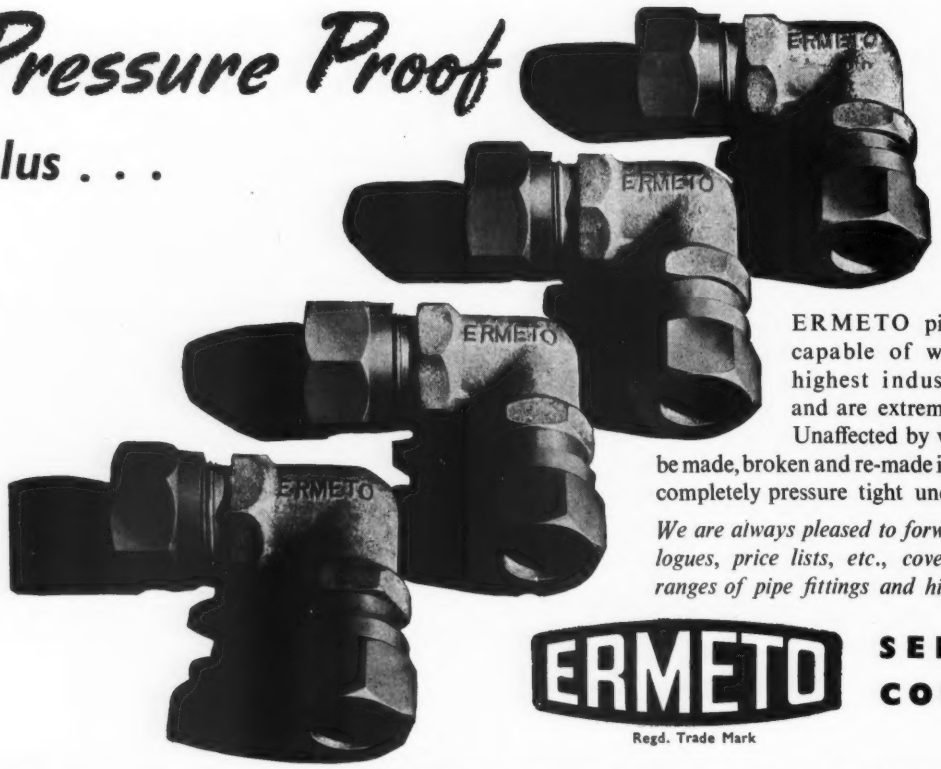

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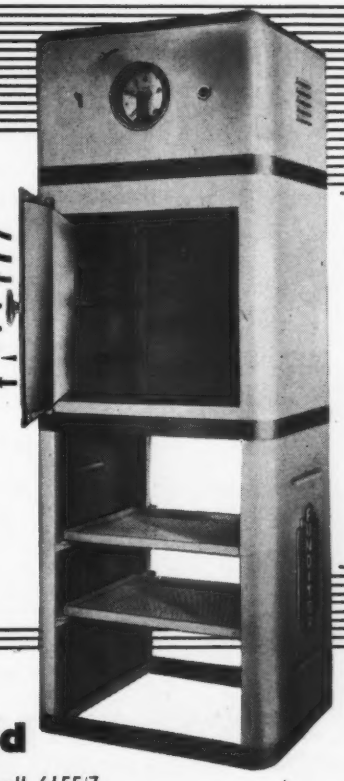

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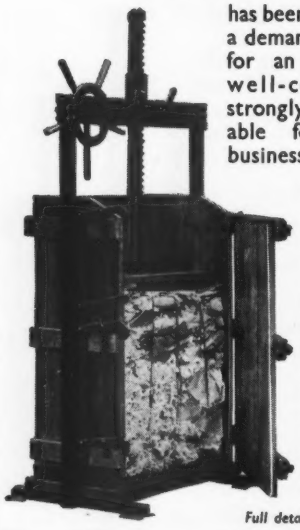

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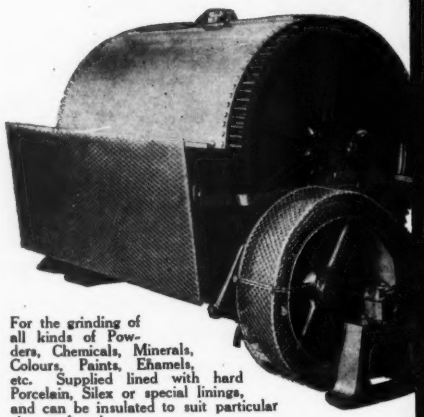

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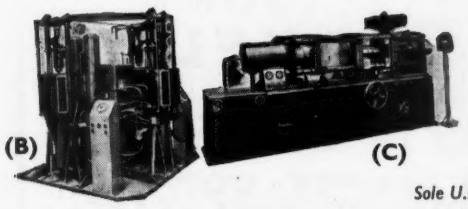

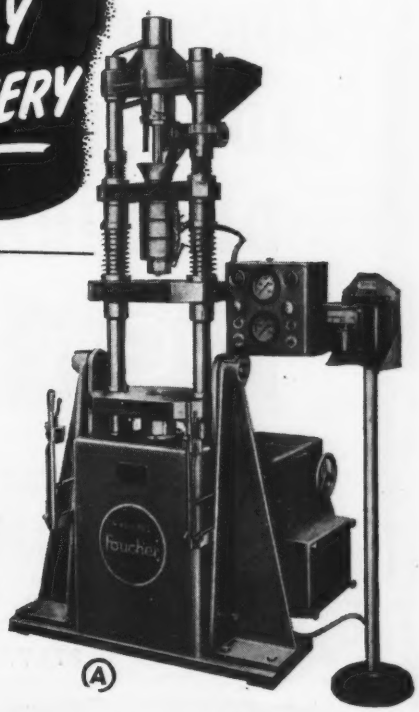

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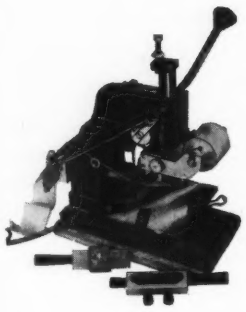

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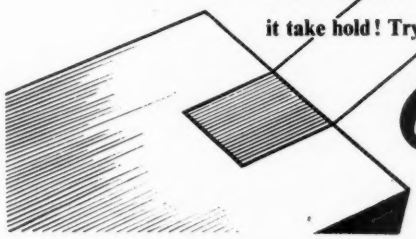

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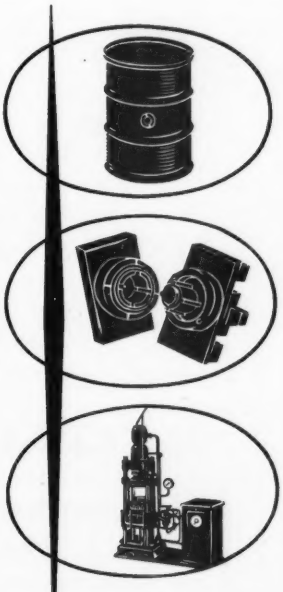

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The bultip sighed and plaintive sighed again
An argusite looked down the hill and screamed
And all the lirus hang on his refrain

Peremptorily the shutters shut in space
The howling syntax cleaves my limbo not
The glymnist peers unknowing in my face
And passing plodders weary plod the plot

Oh will this syke forever be to me
A ghostly ghastly phantom in the night
Or will I soon avert my eyes to see
A wondrous glowing incandescent light

The time has passed I heard it go tik-tok
Tik-tok tik-tok tik-tok tik-tok tik-tok

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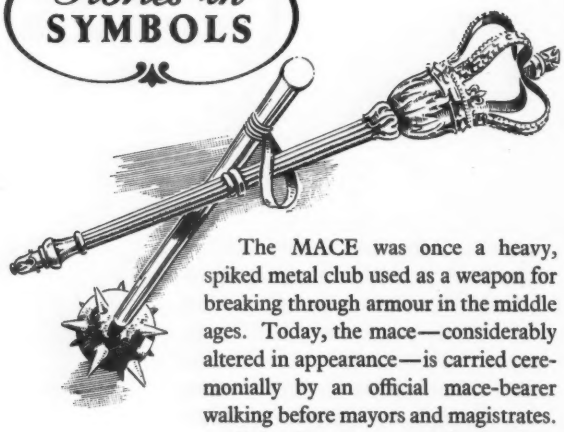

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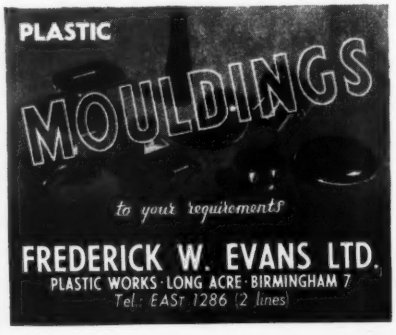

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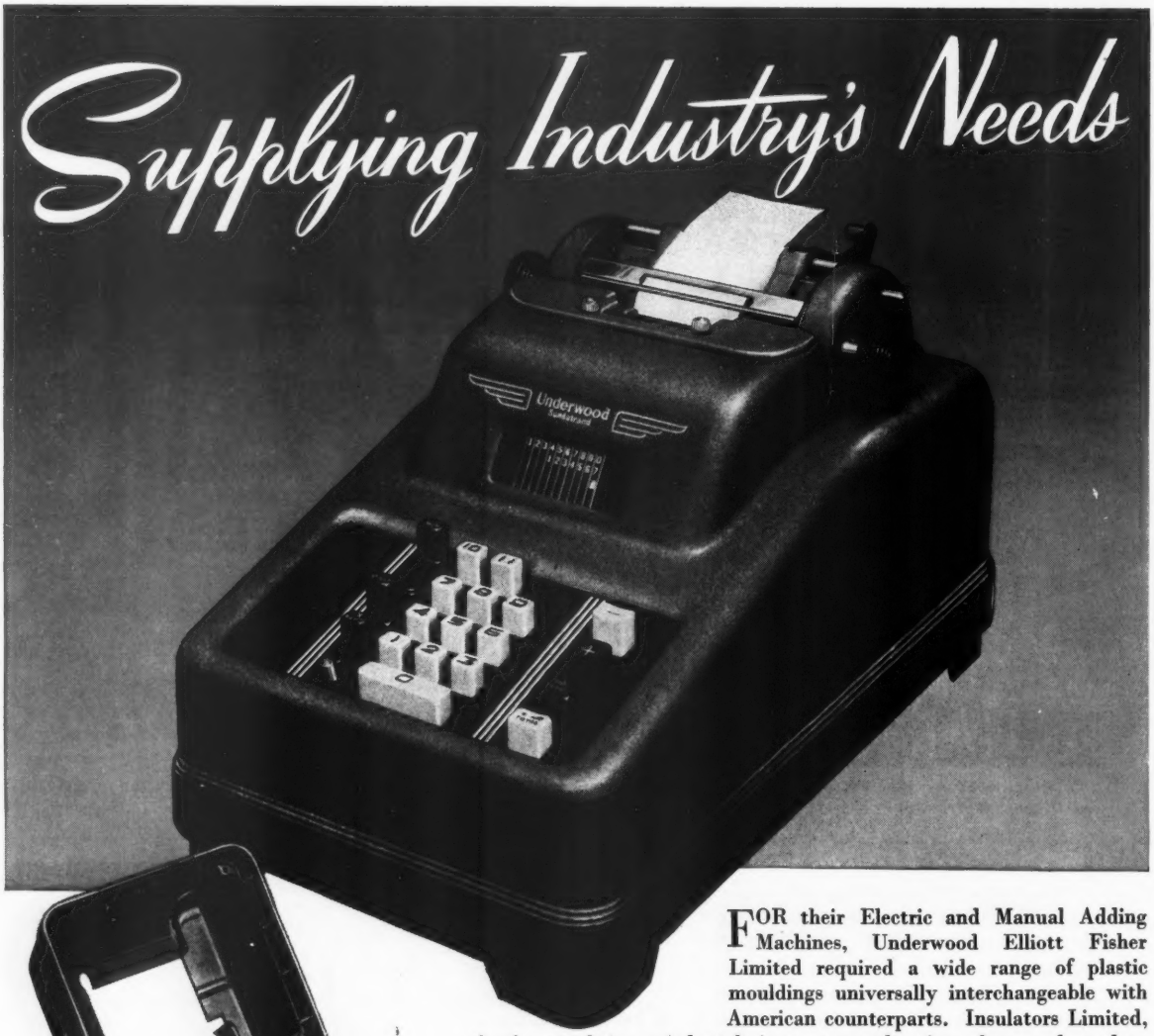

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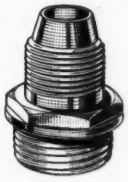
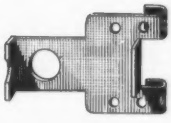
Lathe work  *Pressings in all metals* 

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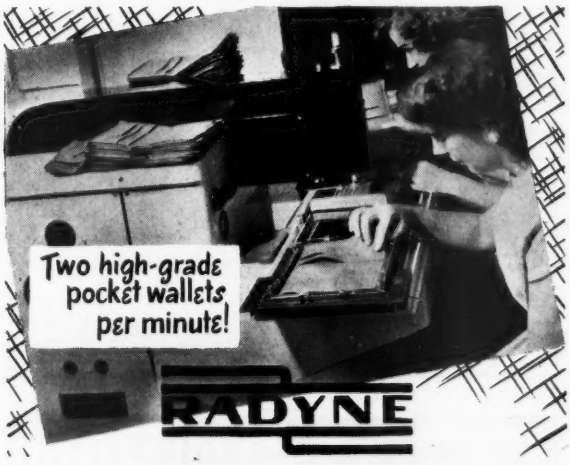

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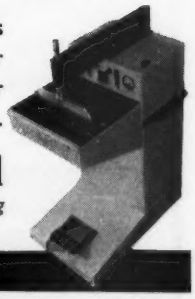

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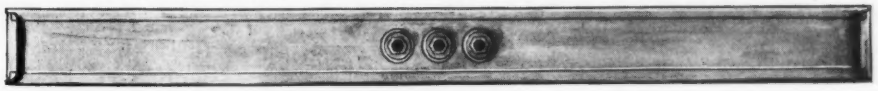

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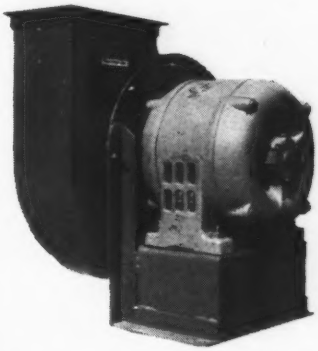

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Machinery, Tools and Plant (contd.)

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POLYSTYRENE, approximately 9,000 lb., refrigerator-white ground scrap, clean material, for disposal. Box P7720, care of "Plastics." 178-24

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EXTRUSION SHOP FOREMAN wanted for wire and cable production. Only absolutely qualified man acceptable with sufficient technical knowledge, experience and drive to fully guarantee smooth production flow. State age, qualifications, jobs held, salary. Box P7521, care of "Plastics." zzz-329

A VACANCY EXISTS for a technical assisant to the managing director of a well-established moulding concern, the selected applicant to later take over the works managership of one of the company's plastic moulding factories in the North. Applicants should have first-rate knowledge of plastic moulding for both compression and injection production, finishing processes and inspection, and also technical experience of extrusion of thermo-plastic materials. Applicants should also be capable of dealing with estimates and quotations. Full details of positions held and qualifications should be stated, also salary required. All applications will be treated in strict confidence. Box P7714, care of "Plastics." 178-2912

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